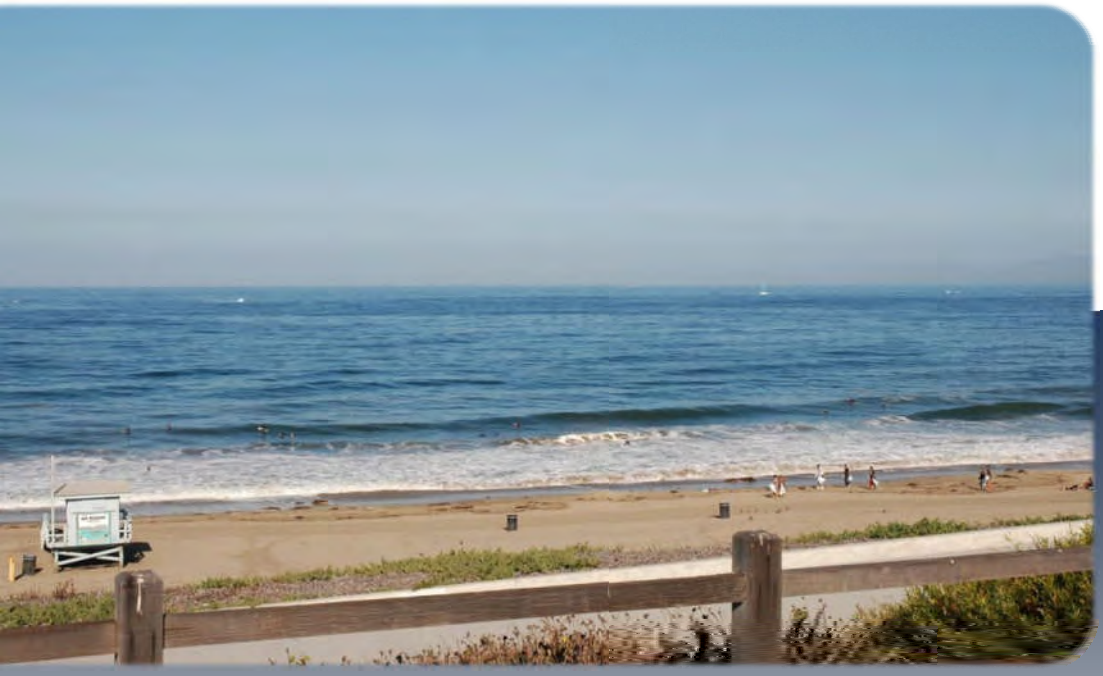
2010

City of Torrance
Urban Water Management Plan



July, 2011

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2010

URBAN WATER MANAGEMENT PLAN

City of Torrance

July 2011

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LIST OF ACRONYMS

AB	Assembly Bill
AF	Acre Feet
AFY	Acre Feet per Year
AMR	Automatic Meter Reading
BMP	Best Management Practices
CALSIM	California Water Allocation and Reservoir Operations Model
CCF	Hundred Cubic Feet
CFS	Cubic Feet per Second
CII	Commercial, Industrial and Institutional
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Program
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CWSC	California Water Service Company
DBP	Disinfection Byproducts
DHS	Department of Health Services
DMM	Demand Management Measure
DWCV	Desert Water Agency/Coachella Valley Water District
DWR	Department of Water Resources
EIR	Environmental Impact Report
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ETo	Evapotranspiration
gpcd	Gallons Per Capita Per Day
gpd	Gallons Per Day
gpm	Gallons Per Minute
HAA	Haloacetic Acids
HEWM	High Efficiency Washing Machines
IAWP	Interim Agricultural Water Program
IID	Imperial Irrigation District
In	Inches
IRP	Integrated Water Resources Plan
IRWM	Integrated Regional Water Management
JWPCP	Joint Water Pollution Control Plant
LACSD	Sanitation Districts of Los Angeles
LADWP	Los Angeles Department of Water and Power
LARWQCB	Los Angeles Regional Water Quality Control Board
LRP	Local Resources Program
M&I	Municipal and Industrial
MAF	Million Acre Feet
MARS	Member Agency Response System
MCL	Maximum Contaminant Level
MG	Million Gallons
mg/L	Milligrams Per Liter (parts per million)
MOU	Memorandum of Understanding
MTBE	Methyl Tertiary Butyl Ether

LIST OF ACRONYMS (cont.)

Metropolitan	Metropolitan Water District of Southern California
NDMA	N-nitrosodimethylamine
PCE	Perchloroethylene
pCi/L	Picocuries per liter
PDA	Protector del Agua
PSP	Proposal Solicitation Package
QSA	Quantification Settlement Agreement
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAB	South Coast Air Basin
SCADA	Supervisory Control and Data Acquisition System
SCE	Southern California Edison
SDP	Seawater Desalination Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TCE	Trichloroethylene
TDS	Total Dissolved Solids
THM	Trihalomethanes
TMW	Torrance Municipal Water
ug/L	Micrograms Per Liter (parts per billion)
ULF	Ultra Low Flush or Flow
ULFT	Ultra Low Flush Toilet
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
WARN	Water Agencies Response Network
WBMWD	West Basin Municipal Water District
WBWRP	West Basin Water Recycling Plant
WOC	Water Operations Center
WRD	Water Replenishment District of Southern California
WSDM	Water Surplus and Drought Management

SECTION 1: INTRODUCTION

1.1 PURPOSE AND SUMMARY

This is the 2010 Urban Water Management Plan (UWMP) for the City of Torrance (City). This plan has been prepared in compliance with the Urban Water Management Planning Act ("Act"), which has been codified at California Water Code sections 10610 through 10656 and can be found in Appendix B to this 2010 Plan.

The legislature declared that waters of the state are a limited and renewable resource subject to ever increasing demands; that the conservation and efficient use of urban water supplies are of statewide concern; that successful implementation of plans is best accomplished at the local level; that conservation and efficient use of water shall be actively pursued to protect both the people of the state and their water resources; that conservation and efficient use of urban water supplies shall be a guiding criterion in public decisions; and that urban water suppliers shall be required to develop water management plans to achieve conservation and efficient use.

The Act requires "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt, in accordance with prescribed requirements, an urban water management plan." Urban water suppliers must file these plans with the California Department of Water Resources (DWR) every five years describing and evaluating reasonable and practical efficient water uses, reclamation, and conservation activities. (*See generally* Water Code § 10631.)

The Act has been amended on several occasions since its initial passage in 1983. New requirements of the Act, due to the Water Conservation Act of 2009, state that per capita water use within an urban water supplier's service area must decrease by 20 percent by the year 2020 in order to receive grants or loans administered by DWR or other state agencies. The legislation sets an overall goal of reducing per capita urban water use by 20 percent by December 31, 2020. The state shall make incremental progress towards this goal by reducing per capita water use by at least 10 percent by December 31, 2015. Effective July 1, 2016, urban retail water suppliers who do not meet the water conservation requirements established by this bill are not eligible for state water grants or loans. An urban retail water supplier shall include in its 2010 UWMP due by August 1, 2011, the baseline daily per capita water use, interim water use target, and compliance daily per capita water use. DWR, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part. These new requirements are included in **Section 4: Water Demands.**

As part of the City's past and current sustainability goals, the City is currently implementing all facets of this plan to achieve its target conservation by 2020.

1.2 COORDINATION

In preparing this 2010 Plan, the City has encouraged broad community participation. Copies of the City's draft plan were made

available for public review at City Hall and the local public libraries in the City. The City noticed a public hearing to review and accept comments on the draft plan with more than two weeks in advance of the hearing. The notice of the public hearing was published in the local press and mailed to City Clerk. On June 21, 2011, the City held a noticed public hearing to review and accept comments on the draft plan. Notice of the public hearing was published in the local press. Following the consideration of public comments received at the public hearing, the City adopted the 2010 Plan on June 21, 2011. A copy of the City Council resolution approving the 2010 Plan is included in **Appendix D**. As required by the Act, the 2010 UWMP is being provided by the City to the California Department of Water Resources, the California State Library, and the public within 30 days of the City's adoption. **Table 1.1** below shows the City's coordination of its 2010 UWMP:

Table 1.1
Coordination and Public Involvement

Entity	Participated in Plan Preparation	Sent 60 Day prior Notice of Intention to review and possibly amend/change	Contacted for Assistance	Commented on Draft	Notified of Public Hearing	Attended Public Hearing	Sent a Copy of the Adopted Plan
California Department of Water Resources			X		X		X
General Public					X	X	
LA County Public Works, Water Resources		X			X		X
LA County Sanitation District					X		
Metropolitan Water District of Southern California			X		X	X	X
Torrance City Clerk					X	X	X
Torrance City Council					X	X	X
Torrance City Manager's Office					X	X	X
Torrance Community Development			X	X	X	X	X
Torrance Public Library					X		X
Torrance Public Works Department	X		X	X	X	X	X
Torrance Water Commission				X	X	X	X
Water Replenishment District			X		X		X
West Basin Municipal Water District			X		X		X

1.3 FORMAT OF THE PLAN

The chapters in this 2010 Plan correspond to the items presented in the Act and are as follows:

Section 1 - Introduction

This chapter describes the UWMP Act background, new amendments to the Act, City's planning and coordination process, the history of the development of the City's water supply system, a description of its existing service area, the local climate, population served and the City's water distribution system.

Section 2 - Water Sources & Supplies

This chapter describes the existing water supplies available to the City. In addition, this chapter discusses potential future water supplies, including transfers and exchanges, recycled water, and desalinated water.

Section 3 – Water Quality

This chapter discuss water quality issues with the City's imported and groundwater sources and their effect on management strategies and supply reliability.

Section 4 – Water Demand

This chapter describes past, current and projected water usage within the City's service area prior to the implementation of future demand management measures.

Section 5 – Reliability Planning

This chapter presents an assessment of the reliability of the City's water supplies by comparing projected water demands with expected water supplies under three different hydrologic conditions: a normal year; a single dry year; and multiple dry years. This 2010 UWMP concludes that if projected imported and local supplies are developed as anticipated, no water shortages are anticipated in the City's service area during the planning period.

Section 6 – Conservation Measures

This chapter addresses the City's compliance as a member of the California Urban Water Conservation Council (CUWCC) with the current Best Management Practices (BMPs). The BMPs correspond to the 14 Demand Management Measures (DMMs) listed in the UWMP Act and are described in this section.

Section 7 – Contingency Planning

This chapter describes the City's current conservation activities, as well as those efforts that will be utilized in the event of a water supply interruption. The City's water shortage contingency plan was developed in consultation and coordination with other MWD member agencies. In addition, MWD's Water Surplus and Drought Management Plan (WSDM) is also described.

Section 8 – Water Recycling

This chapter describes past, current and projected recycled water use, along with a description of wastewater collection and treatment facilities.

1.4 WATER SYSTEM HISTORY

The City of Torrance was founded in 1912 by Jared Sidney Torrance. The City was officially incorporated in 1921. A portion of the original settlement from 1912 exists to

this day and is known as Old Town Torrance as shown in **Figure 1.1** below.

Figure 1.1: Old Town Torrance

From its foundation in 1912, the City grew as a residential and industrial community. Due to continued development, the City of Torrance joined the recently formed Metropolitan Water District (MWD) in 1931. MWD was originally founded in 1928 to build the Colorado River Aqueduct to supplement the water supplies of the original founding members. In 1972, MWD augmented its supply sources to include deliveries from the State Water Project via the California Aqueduct. Today, MWD serves more than 145 cities and 94 unincorporated communities.

1.5 CITY WATER SERVICE AREA

The Torrance Municipal Water (TMW) service area is approximately 10,350 acres and comprises about 78 percent of the land within City limits. California Water Services provides water service to the remaining portion of the City. Although the City's boundaries extend to the Pacific Ocean, TMW does not provide water service to its coastal residents. TMW's service area is bounded by the Cities of Los Angeles, Redondo Beach, Lawndale, Gardena, Lomita, Rolling Hills Estates, Palos Verdes Estates, and unincorporated areas of Los Angeles County. Along the southern edge of the service area are the Palos Verdes Hills, which rise about 450 feet at TMW's southern border. Land use within the service area is principally composed of single and multi-family residences, a centralized business and commercial district, and some institutional and industrial areas. Since the area is at built-out conditions, additional growth will result from redevelopment of existing parcels.

1.6 CLIMATE

The City has a Mediterranean climate with moderate, dry summers with an average temperature of about 80°F and cool, wet winters with an average temperature of 67°F. The average rainfall for the region is approximately 13 inches. Evapotranspiration (ETo) in the region averages 49.7 inches annually. **Table 1.2** below lists the 50 year average monthly rainfall for the City based on data gathered by WoldClimate.com:

Table 1.2
Torrance Climate Characteristics

Month	Rainfall (in)	ETo
Jan	3.1	1.9
Feb	2.9	2.2
Mar	2.2	3.4
Apr	0.9	4.8
May	0.1	5.6
Jun	0	6.3
Jul	0	6.5
Aug	0.1	6.2
Sep	0.2	4.8
Oct	0.3	3.7
Nov	1.3	2.4
Dec	2.2	1.9
Totals:	**13.3**	**49.7**

Overall, the City's climate characteristics are comparable to other cities within the South Coast region. The climatic conditions since

2005 have note varied significantly enough to affect the 50 year averages.

1.7 POPULATION

According to the most recent Census data, the 2010 resident population of the City is approximately 145,000 persons. Since the City's service area accounts for about 70.8 percent of the City's total residents, the total current resident population served by the TMW system is approximately 103,000 persons. Population is expected to expand very modestly with an annual growth rate about 0.5 percent annually (2000-2010 Census growth rate) over the next 25 years as shown in **Table 1.3** below.

Table 1.3
Population Projections

Year	Service Area Population	Citywide Population
2015	105,715	149,110
2020	108,384	152,876
2025	111,126	156,736
2030	113,927	160,694
2035	116,804	164,752

Since Torrance is a major commercial center for the region, daytime population has been estimated slightly over 200,000, due in large part to the number of businesses, and facilities located in the City.

1.8 WATER SYSTEM

The City's Public Works Department manages the health and welfare of the City's infrastructure and natural resources. To address these responsibilities more effectively, Public Works is organized into two major functional sectors, Engineering/Capital Projects and Operations. The Public Works Department consists of 205 full time staff and an annual operating budget of over $55,000,000. The Public Works Department provides high-quality service for those that live and/or work in the community. The Department is expanding its efforts to include more information on water conservation and refuse recycling to ensure that the City uses resources in a cost effective and environmentally responsible manner.

The Municipal Water Utility, known as "Torrance Municipal Water" or "TMW" has personnel assigned from various Public Works sections: Water Operations, Engineering, and Administration. The Operations section is responsible for providing high quality drinking water through the operation and maintenance of water production, the water distribution system, water treatment, and storage facilities. The Engineering section is responsible for the Capital Improvement Program which consists of the development and replacement of water system infrastructure. In coordination with Management, the Administrative Staff is responsible for acting as the liaison with outside agencies, most notable the State and County Health Departments, water districts and other regulatory agencies. In addition, the Administrative Services section, along with management, supports the Torrance Water Commission (which functions as an advisory board to the City Council) and the City's representative on the MWD Board of Directors. Additional Administrative Staff responsibilities include developing and monitoring the Operations budget, the Capital Improvement budget, and the water rates. Administrative Staff also provides customer service and administers water conservation programs.

Water Supply

TMW has five imported water connections

with a total capacity of 33,666 gallons per minute (or 54,300 acre-feet per year) to receive imported water from MWD. The City typically imports up to its Tier 1 limit of 20,967 AFY in order to avoid additional costs of MWD's Tier 2 pricing.

In addition to imported water, TMW has one active well (Well #9) and one inactive or standby well (Well #7) to pump groundwater from the West Coast Basin. The City is also planning the construction of a well field in north Torrance to allow pumping of up to its full groundwater rights.

TMW also receives desalinated water (brackish groundwater) from its Robert W. Goldsworthy Desalter facility, (see **Figure 1.3** on the following page). This Desalter is owned by the Water Replenishment District of Southern California (WRD) and operated by TMW. The desalinated water produced from the plant is for the exclusive use by TMW and the plant can provide up to 10 percent of the total water supply (2.5 million gallons per day) and has room for future expansion.

Finally, TMW receives recycled water from West Basin Municipal Water District (WBMWD). WBMWD receives secondary effluent from the City of Los Angeles Hyperion Wastewater Treatment Plant and provides tertiary treatment to meet Title 22 standards. TMW purchases recycled water from WBMWD's Water Recycling Project. The recycled water comes from the West Basin Water Recycling Plant located in El Segundo.

Water Storage

For storage needs, TMW maintains four water storage reservoirs ranging in capacity from 0.9 million gallons (MG) to 18.7 MG with a total capacity of 30.6 MG. Two of these reservoirs are large underground reservoirs and two are standard above ground tanks. **Figure 1.2** below shows the 1.0 MG North Torrance Reservoir at the City's McMaster Park.

Figure 1.2: 1.0 MG North Torrance Reservoir

TMW's reservoir statistics are listed below in **Table 1.4**:

Table 1.4
TMW Water Storage Facilities

Reservoir	Description	Capacity (MG)
Walteria	Underground	18.7
Ben Haggot	Underground	10.0
North Torrance	Above Ground	1.0
Border Avenue	Above Ground	0.9
	Total Capacity:	**30.6**

Distribution System

TMW distributes its water to approximately 26,500 service customers through a 320 mile network of distribution mains with pipelines sizes ranging from 2 to 24 inches. The water system consists of three (3) pressure zones that provide sufficient water pressure to customers. The water service area, water pressure map, and land use map are shown in **Figures 1.4** to **1.6** on Pages 1-8 through 1-10.

Figure 1.3: City Services Facility

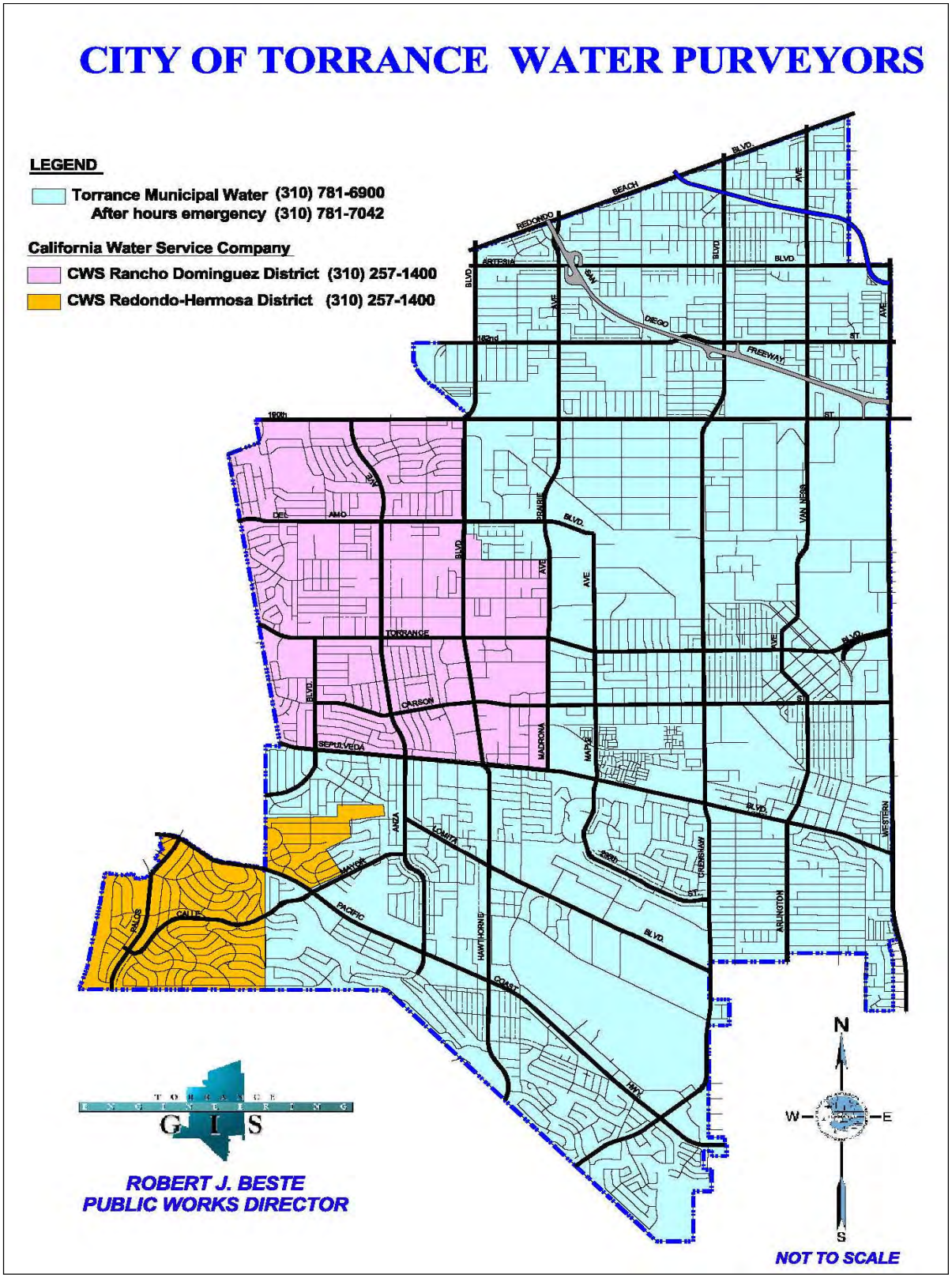

Figure 1.4: TMW Service Area

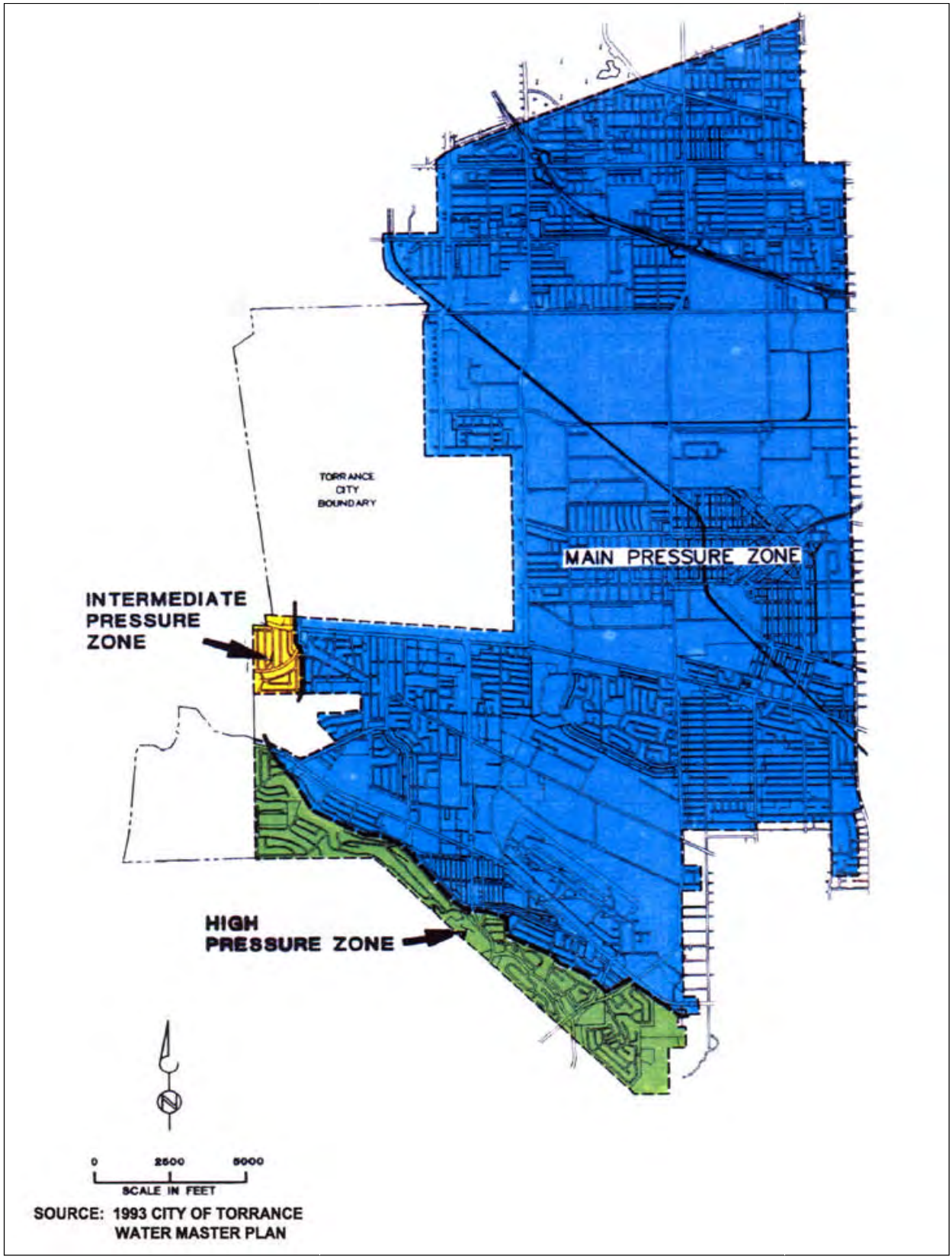

Figure 1.5: TMW Pressure Zones

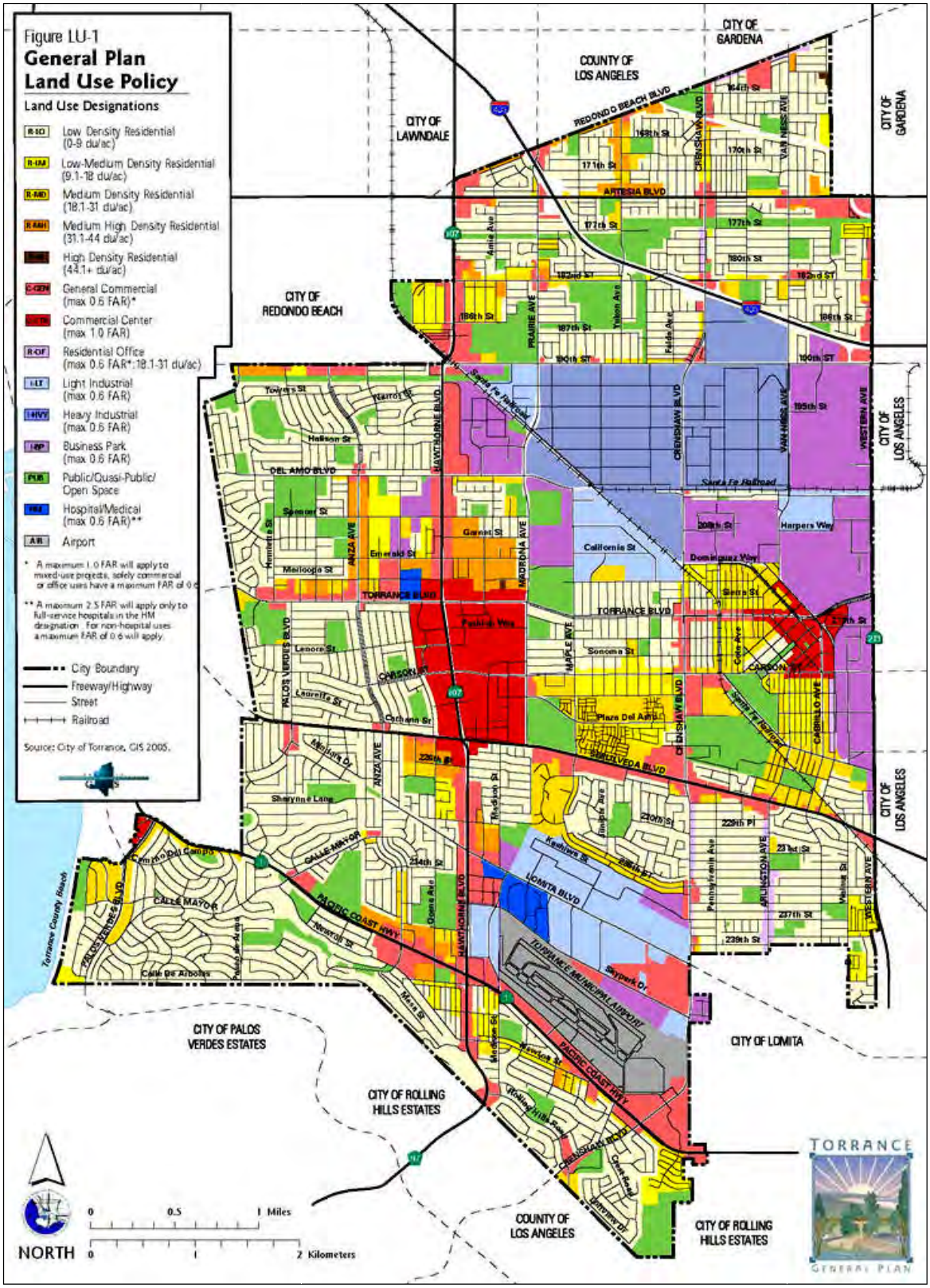

Figure 1.6: City of Torrance Land Use Map

Emergency Interconnections

TMW maintains four, two-way emergency inter-connections to adjacent water purveyor systems. These connections have the ability to transfer approximately 9,900 gpm into TMW's distribution system. There are two 8-inch connections to the City of Lomita, one 8-inch connection to California Water Service Company (CWSC), and one 12-inch connection to the CWSC system. Each has a two-way interconnection, allowing water transfers to and from TMW, depending on the emergency situation. There are also two 10-inch one way metered interconnections that can only flow from TMW to CWSC. A list of the water system interconnections is provided in **Table 1.5** on the following page.

Table 1.5
Water Purveyor Inter-Connections[1]

Inter - Connection	Size (in.)	Pressure (psi)			Capacity (cfs)	Location
		Normal	Low	High		
TMW - CWSC	8	70	50	90	4	Ellinwood Drive and Sepulveda Boulevard
TMW - Lomita[2]	8	75	60	100	4	Near 239th Street and Arlington Avenue
TMW - Lomita[2]	8	75	60	100	4	Near 240th Street and Pennsylvania Avenue
TMW - CWSC	12	NA[3]	NA[3]	NA[3]	NA[3]	Walnut Street near 230th Street
TMW - CWSC[4]	2 - 10	70	60	90	10	Del Amo Boulevard and Maple Street

Notes :

1) Data provided by West Basin Municipal Water District
2) City of Lomita
3) Data Not Available
4) One way flow only from TMW to CWSC

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SECTION 2: WATER SOURCES & SUPPLIES

2.1 INTRODUCTION

TMW's water supply sources consist of imported water purchased from MWD, groundwater produced from the West Coast Basin, water produced from the Goldsworthy Groundwater Desalter, and recycled water produced at West Basin's Recycling facility in El Segundo.

2.2 WATER SUPPLY SOURCES

Imported Water

TMW has access to imported MWD water from the Colorado River and the Sacramento-San Joaquin River Delta in Northern California (see **Figures 2.1** & **2.2**). These two water systems provide Southern California with approximately 2 million acre-feet (MAF) of water annually for urban uses. The Colorado River supplies about 4.4 MAF annually for agricultural and urban uses with approximately 3.85 MAF apportioned for agriculture in Imperial and Riverside Counties. The remaining unused portion (600,000 - 800,000 AF) is used for urban purposes in MWD's service area.

Figure 2.1: Parker Dam at Colorado River

In addition to the Colorado River, the Sacramento-San Joaquin River Delta provides a significant amount of supply annually to Southern California. The Delta is located at the confluence of the Sacramento and San Joaquin Rivers east of the San Francisco Bay and is the West Coast's largest estuary. The Delta supplies Southern California with over 1 MAF of water annually.

Figure 2.2: Sacramento-San Joaquin Delta

The use of water from the Colorado River and the Sacramento-San Joaquin Delta continues to be a critical issue. In particular, Colorado River water allotments have been debated among the seven basin states and various regional water agencies at both the federal and state levels. The use of Delta water has been debated as competing uses for water supply and ecological habitat have jeopardized the Delta's ability to meet either need and have threatened the estuary's ecosystem.

In order to provide Southern California imported water, MWD utilizes two separate aqueduct systems (one for each source of supply) to obtain its supplies. These two aqueduct systems convey water from each source into two separate reservoirs whereupon MWD pumps the water to one of its five treatment facilities. One of these

aqueduct systems is known as the Colorado River Aqueduct (CRA) as shown below in **Figure 2.3**. The CRA was constructed as a first order of business shortly after MWD's incorporation in 1928. The CRA is 242 miles long and carries water from the Colorado River to Lake Matthews and is managed by MWD.

Figure 2.3: Colorado River Aqueduct

In addition to the CRA, MWD receives water from northern California via the California Aqueduct shown below in **Figure 2.4**. Also known as the State Water Project, the California Aqueduct is 444 miles long and carries water from the Delta to Southern California and is operated by the Department of Water Resources.

Figure 2.4: California Aqueduct

The previously mentioned aqueducts supply Southern California with a significant amount of its water and are crucial to its sustainability. In addition to these two water systems, there are also many other aqueducts that are vital to the State. The major aqueducts in California are shown in **Figure 2.5** on page 2-3. Overall, about 67 percent of imported water comes from the SWP and 33 percent comes from the CRA.

Imported Water Purchases

As a wholesale agency, MWD distributes imported water to its 26 member agencies throughout Southern California as shown in **Figure 2.6** on Page 2-4. TMW is one of 15 primarily retail agencies served by MWD and receives imported water from five interconnections ranging in capacity from 2,245 gpm to 11,220 gpm. The interconnections are capable of serving up to 100 percent of TMW's water needs if necessary. **Table 2.1** presents TMW's recent imported water purchases from fiscal year 2005-2010. Imported water over this time period has accounted for over 90 percent of TMW's potable water supply totals.

Table 2.1
Purchases from MWD
FY 2005-2010

Year	Purchases (AF)
2010	16,471
2009	19,352
2008	19,306
2007	21,100
2006	21,338
2005	20,046
Average:	**19,602**

TMW's tier 1 rate allocation from MWD in 2005 was 20,967 AFY and the current (2010) limit is 20,967 AFY. As indicated by **Table 2.1**, TMW's imported water purchases for 2006 exceed their Tier 1 rate allocation due to the inactivity of Well #6.

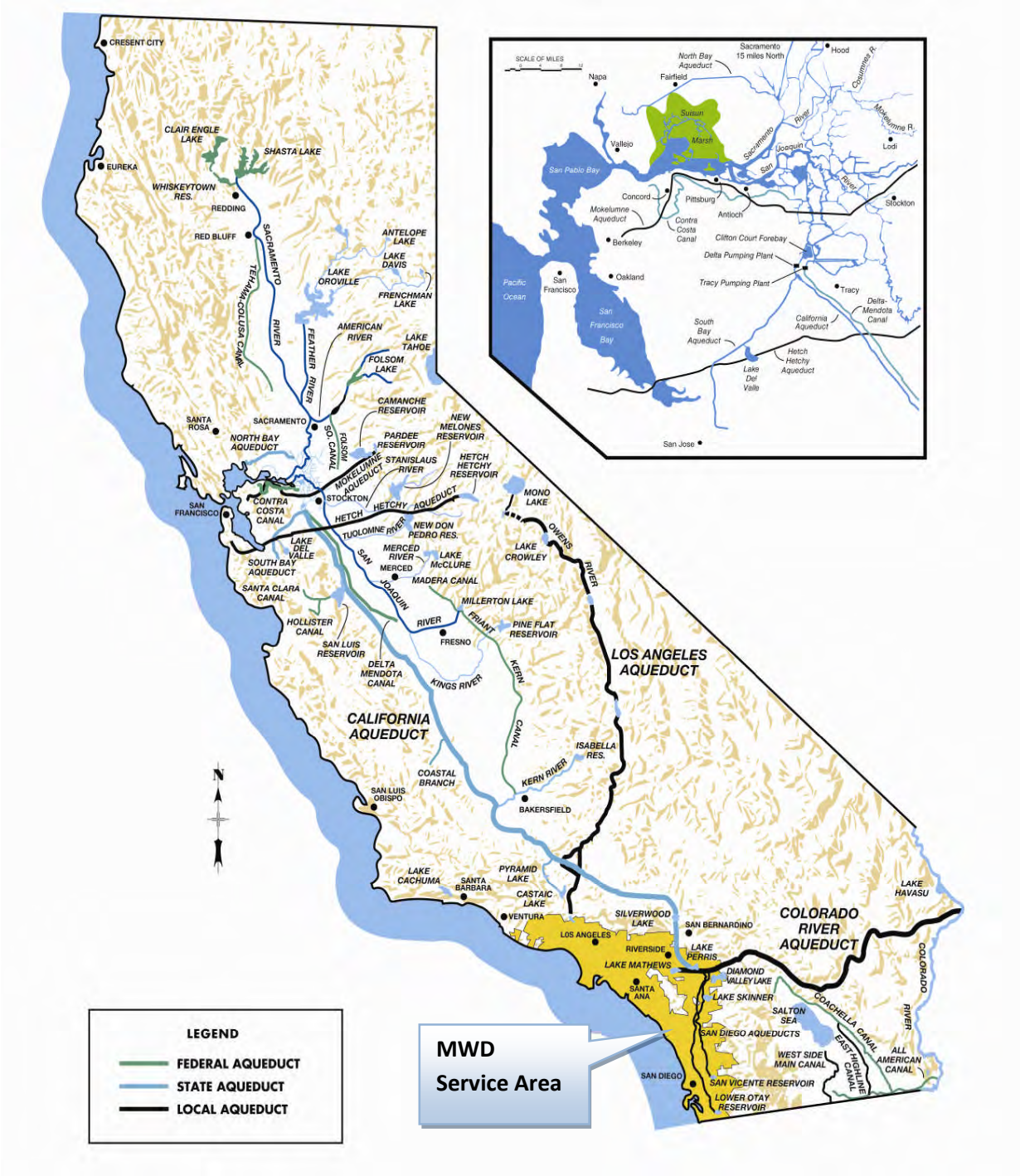

Figure 2.5: Aqueduct Systems in California

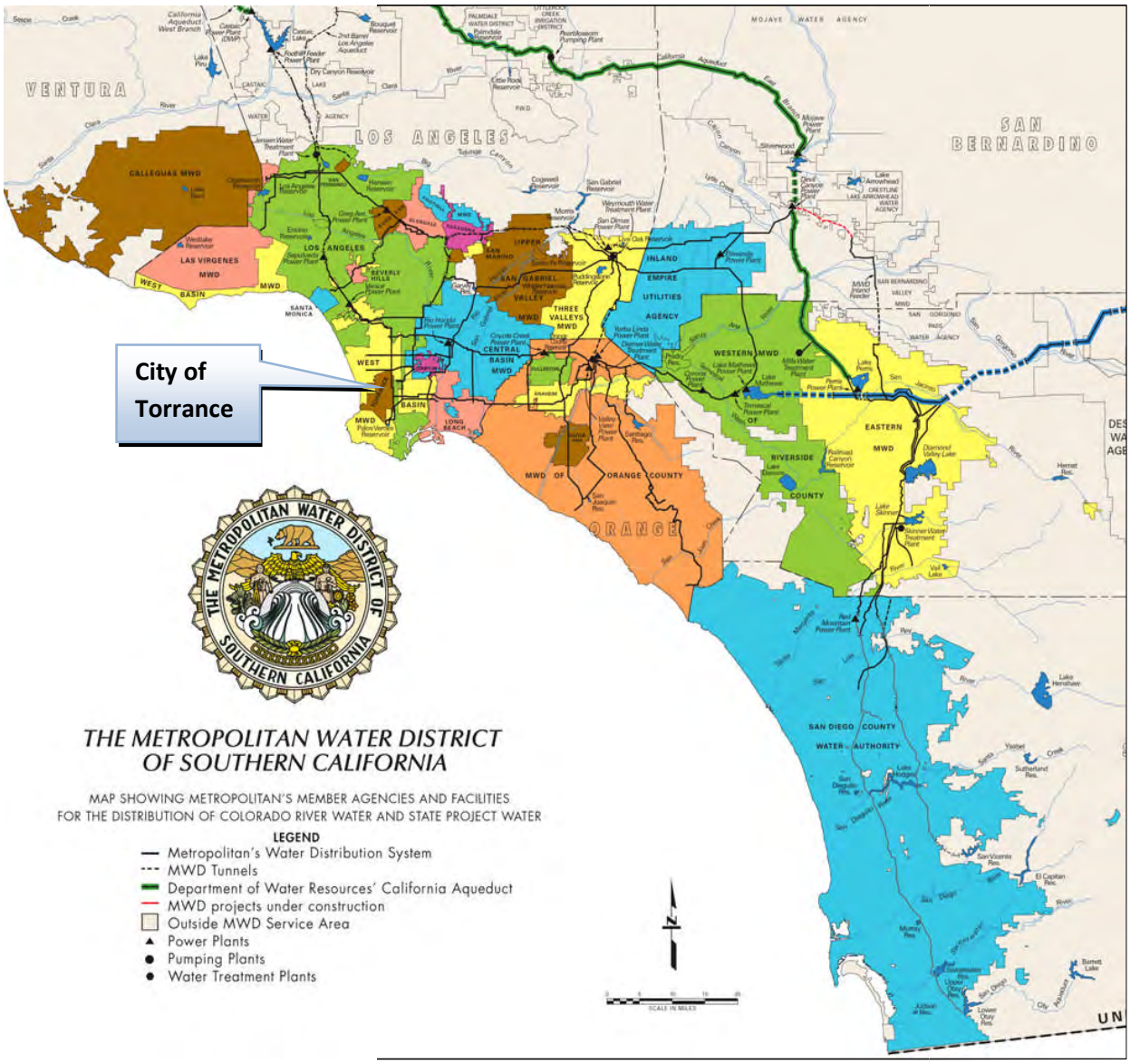

Figure 2.6: MWD Service Area Map (City of Torrance Shown in Brown)

Groundwater

TMW obtains its groundwater supply from the West Coast Groundwater Basin. The basin is located in western Los Angeles County and overlies the entire City of Torrance and all or portions of eleven (11) other cities in the region. The Basin has a surface area of 160 square miles of flat to hilly terrain. The basin is bounded by the Ballona Escarpment (Bluffs) to the North, consolidated rocks of the Palos Verdes Hills and the Pacific Ocean to the South, the Newport-Inglewood fault to the East, and the Pacific Ocean to the West. Adjacent groundwater basins include the Santa Monica, Central, and Orange County Basins as shown in **Figure 2.7** below.

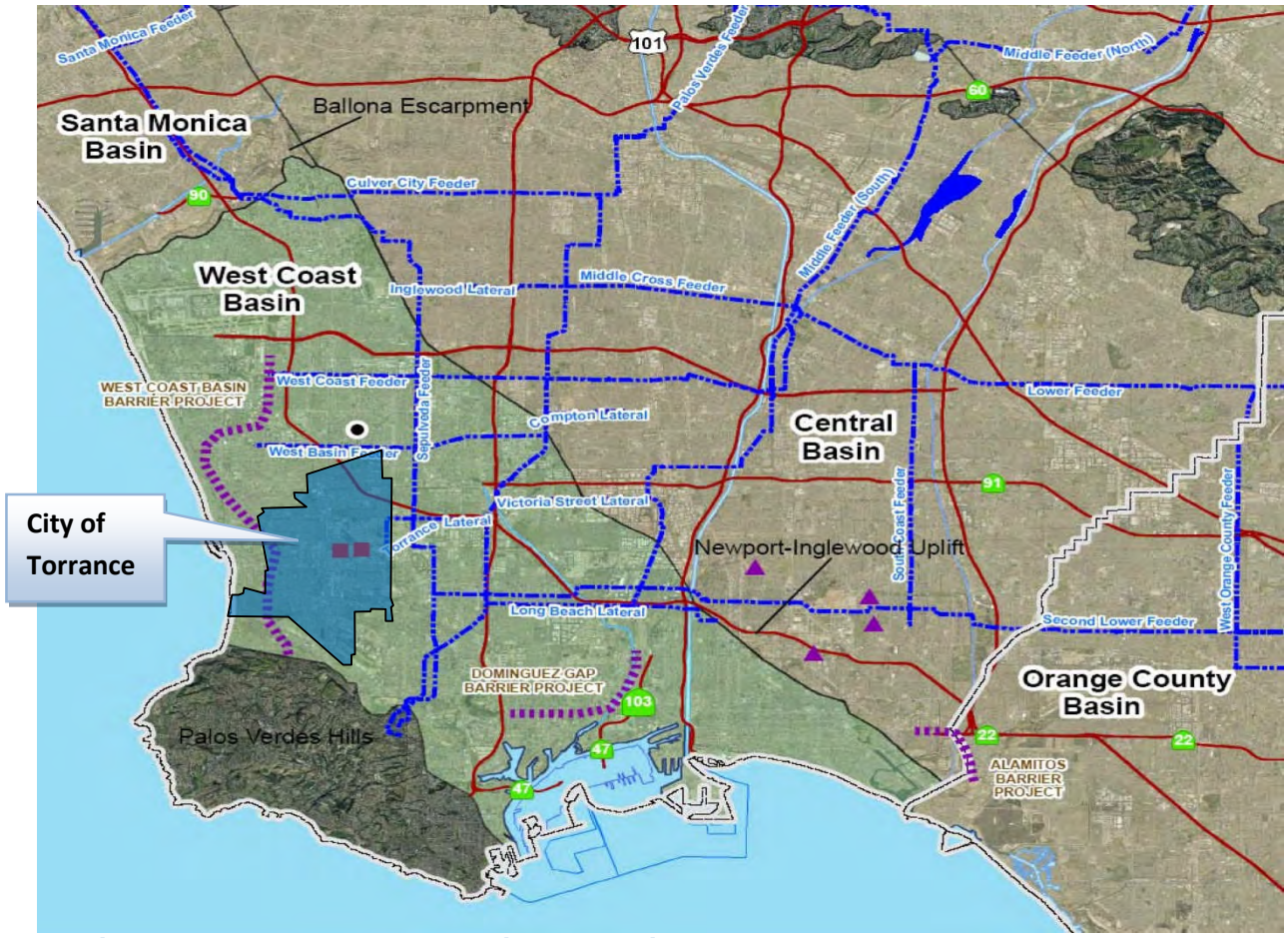

Figure 2.7: West Coast Groundwater Basin

Water-bearing deposits of the Basin include unconsolidated and semi-consolidated marine and alluvial sediments deposited over time. Key production aquifers include the Gardena, Gage, Lynwood, and Silverado aquifers. Groundwater is mainly confined, although the Gage and Gardena aquifers are unconfined where water levels have dropped below the Bellflower aquiclude. The Silverado aquifer, which underlies most of the basin, is the most productive aquifer, yielding up to 90 percent of the groundwater extracted annually with a thickness of 250-550 feet. No domestic supplies are produced from the upper aquifers due to contamination in the upper zone.

Groundwater in the Basin is replenished naturally by percolation from precipitation, receiving an average annual precipitation of 14 inches, by subsurface inflows from the Central Basin to the East, and by infiltration of surface inflows from the Los Angeles and San Gabriel Rivers. Since the basin is mostly urbanized and soil surfaces have been paved to construct roads, buildings, and flood channels, natural replenishment to the basin's water-bearing formations is limited to only a small portion of basin soils. However, the basin receives additional replenishment provided by artificial re-charge from the Water Replenishment District's (WRD's) injection wells.

Groundwater flow in the basin is generally from the Ballona Escarpment in the North (see **Figure 2.9**) and the Central Basin to the East towards the Pacific Ocean in the West and Palos Verdes Hills (see **Figure 2.8** below) in the South. Typical flow patterns are southward and westward.

Figure 2.8: Palos Verdes Hills

The total storage in the basin is estimated to be approximately 6.5 million acre-feet (MAF). Unused storage is estimated to be approximately 1.1 MAF. In 2006, a natural safe yield of the Basin (natural replenishment only) was estimated by WRD to be about 26,000 AFY. As a result of artificial recharge activities, the adjudicated rights stand at 64,468.25 AFY.

Groundwater levels in the basin are generally at or above mean sea level (MSL), although low water levels in portions of aquifers underlying the Pacific Ocean allow for seawater intrusion to occur. WRD estimates that up to 7,100 AFY of seawater enters portions of aquifers on the West Coast Basin.

Figure 2.9: Ballona Creek & Escarpment (Bluffs)

Due to seawater intrusion, there are a two seawater intrusion barriers in the West Coast Basin: the West Coast Basin Barrier Project and the Dominguez Gap Barrier Project. These seawater intrusion barriers inject a combined average of 24,000 AFY along the coastline and the Dominguez Channel to protect the basin from seawater intrusion.

Due to the natural replenishment of the basin and existing additional artificial recharge by WRD, there are no spreading basins in the West Coast Basin. In an effort to eliminate long-term overdraft conditions, WRD closely monitors the groundwater basins for fluctuations in groundwater levels. WRD utilizes a groundwater model developed by the United States Geological Survey (USGS) to study and better understand the Basin's reaction to pumping and recharge. WRD works closely with the Los Angeles County Department of Public Works, Metropolitan, and LACSD on current and future replenishment supplies.

The West Coast Basin is an adjudicated basin and the management of water resources and operations in the basin is provided by WRD, DWR, the LA County Department of Public Works, and the Regional Water Quality Control Board. The California Department of Health Services provides additional oversight of the Basin's groundwater quality and help monitor contaminant levels.

The key characteristics of the West Coast Basin are summarized below in **Table 2.2**:

Table 2.2
West Coast Basin
Summary of Characteristics

Item	Amount
Max. Depth to Groundwater	2,000 ft.
Thickness of Groundwater Table	180-1,050 ft.
Storage	6.5 MAF
Natural Safe Yield	26,300 AFY
Adjudicated Rights	64,468 AFY
Spreading Basins (Total)	0
Seawater Intrusion Barriers	2
Desalters	2

Groundwater Production

TMW maintains one active well (Well #9) and one standby well (Well #7) for groundwater extraction. Well #6 has been de-activated in late 2010 and has been replaced by new Well #9. Well #7 is used only on an as-needed basis for fire flow demands or other emergencies. Each of TMW's wells are equipped with flow meters to measure water production. Water production is recorded monthly by TMW water staff and reported annually to the Department of Water Resources (DWR). Over the past five years, groundwater extraction has ranged from 0 AF to 1,487 AF (average of 878 AF). **Table 2.3** displays TMW's groundwater supplies from fiscal year 2005-2010:

Table 2.3
Groundwater Production (Well #6)
FY 2005-2010

Year	Production (AF)
2010	1,106
2009	675
2008	1,487
2007	884
2006	0
2005	1,118
Average:	**878**

Groundwater represents only a small portion of TMW's overall water supply (about 5 percent) due to the City's Well #7 water quality issues and lack of well capacity. With planned wells in the northern portion of the City, however, TMW intends to increase its groundwater production to its adjudicated right of 5,640 AFY.

Goldsworthy Desalter (Groundwater)

The Robert W. Goldsworthy Desalter began operation in 2001 under the direction of WRD. The desalter facility was constructed to treat brackish groundwater resulting from a saline plume located in the Basin and currently treats up to approximately 2.75 MGD. The plant treats saline water using microfiltration and reverse osmosis. The product water meets all the state and federal drinking water standards and is used as

drinking water for the City. As of February 2010, TMW operates the facility.

The desalted water received by TMW is used as a supplemental potable water supply source. Over the past five years TMMW purchased an average of 1,494 AF of groundwater annually from the Desalter. **Table 2.4** summarizes the past sales to TMW from fiscal year 2005-2010:

Table 2.4
Goldsworthy Desalter Production
FY 2005-2010

Year	Production (AF)
2010	1,181
2009	646
2008	1,271
2007	2,005
2006	1,779
2005	2,082
Average:	**1,494**

The pumping and treatment of this groundwater aids in halting the migration of the saline plume, and is a groundwater quality mitigation project. In addition, the utilization of this groundwater creates a new source of supply, expands the availability of local water supplies, reduces TMW's reliance on imported supplies from MWD, and further drought-proofs the community

Recycled Water

TMW has significant industrial and commercial water customers which cannot alter their water consumption characteristics during drought periods. To enhance water supply reliability in the City and the region, TMW contracts with West Basin Municipal Water District (WBMWD) for the delivery of recycled water for non-potable industrial and landscape irrigation uses to supplement its water supply. WBMWD developed a regional water recycling program known as the West Basin Water Recycling Project. West Basin's transformation from imported water wholesaler to a leader in conservation and water recycling can be traced back to California's severe drought period between the late '80s and early '90s. In 1992, West Basin received state and federal funding to design and build a world-class, state-of-the-art water recycling treatment facility in the City of El Segundo, with its own visitor's education center (see **Figure 2.10** below).

Figure 2.10: Edward C. Little Recycling Facility

West Basin's water recycling facility, known as the Edward C. Little Water Recycling Facility (ELWRF -see **Figure 2.11**) receives secondary effluent from the Hyperion Wastewater Treatment Plant. Secondary effluent is pumped from Hyperion to the ELWRF via the Hyperion Secondary Effluent Pump Station (HSEPS), which is owned and maintained by West Basin. The ELWRF was completed in 1998 and has been expanded several times to meet the increasing needs of the region. The facility currently provides up to 57 million gallons per day (mgd) to various customers in WBMWD's service area, including several cities and private industrial customers.

The ELWRF is one of the largest water

recycling facilities of its kind in the United States and was recognized by the National Water Research Institute in 2002 as one of only six National Centers for Water Treatment Technologies. The ELWRF is the only treatment facility in the country that produces five different qualities of "designer" or custom-made recycled water that meet the unique needs of West Basin's municipal, commercial and industrial customers. The five types of designer water include: Tertiary Water (Title 22), Nitrified Water, Softened Reverse Osmosis Water, Pure Reverse Osmosis Water, and Ultra-Pure Reverse Osmosis Water. West Basin's customers use recycled water for a wide variety of industrial and irrigation needs.

Figure 2.11: Edward C. Little Recycling Facility

To meet the increasing needs of its customers and to provide additional supply capacity to the region, WBMWD is proposing the Phase V Expansion of the ELWRF. The proposed project would increase treatment capacity from the existing 57 mgd to 63 mgd and would include expanding the Title 22 (pretreatment and filtration processes) recycled water system, the microfiltration (MF) treatment system, the reverse osmosis (RO) treatment system and ultraviolet (UV) disinfection treatment systems to meet the proposed increase in capacity, installation of ozone pretreatment process for the MF treatment system, and the upgrade to the support facilities that manage the waste-handling processes and various ancillary process capacities. The initial study and negative declaration for the project was prepared in March 2011 and is included in Appendix G.

Recycled Water Purchases

TMW purchases recycled water produced at the ELWRF from WBMWD through the Water Recycling Project. Recycled water purchases in the City include direct

purchases by TMW and purchases by Exxon Mobil. Overall, about 95 percent of the recycled water used within the City is attributable to Exxon Mobil. **Table 2.5** below lists the past recycled water purchases in the City from 2005-2010:

Table 2.5
Recycled Water Purchases from WBMWD
FY 2005-2010

Year	ExxonMobil (AF)	TMW (AF)
2010	6,161	272
2009	5,599	278
2008	6,180	311
2007	5,774	284
2006	6,161	258
2005	6,767	182
Average:	**6,107**	**264**

Over the past five years, recycled water has accounted for about 23 percent of the overall water supply in TMW's service area.

2.3 WATER SUPPLY SUMMARY

Over the past five years, TMW's lack of groundwater pumping facilities has limited the City's groundwater supplies to less than one fifth (approximately 14 percent) of their adjudicated pumping right. Imported water, therefore, has accounted for over 90 percent of TMW's total potable water supply. Overall water use in the City, however, is balanced by the use of recycled water used by TMW and Exxon Mobil. TMW benefits immensely from Exxon Mobil's use of recycled water purchased directly from WBMWD as this saves about 6,000 - 6,500 AFY of potable water which would have otherwise been used to support Exxon Mobil's industrial processes.

2.4 PROJECTED SUPPLY OUTLOOK

TMW understands the need to discover and support local water supply projects in an effort to decrease dependence on imported supplies. As part of this process, TMW is in the process of upgrading its groundwater supply facilities to include the addition of at least two new wells in the North Torrance Well Field in the northern part of the City. These wells will help TMW to extract their adjudicated pumping right of 5,640 AFY. WRD is upgrading the Goldsworthy Desalter to increase its near term capacity to about 2,400 AFY. TMW intends to purchase 2,400 AFY of this treated supply to augment its water supply. As a result of these improvements, TMW expects to reduce their dependency on imported water. TMW expects MWD will maintain the City's Tier 1 limit of 20,967 AFY and understands that this limit may change. The use of recycled water is expected to increase gradually over time with additional conversions of landscape customers to recycled supplies and possible use of additional recycled water at the ExxonMobil Refinery.

Table 2.6
Projected Water Supply Availability

Year	Potable (AF)	Recycled (AF)
2015	29,007	6,650
2020	29,007	6,650
2025	29,007	7,150
2030	29,007	7,150
2035	29,007	7,150

Overall, TMW's supply reliability is expected to increase through the implementation of planned improvements to its groundwater facilities, WRD's Goldsworthy Desalter expansion, through

continued access to imported water, and through continued and planned use of recycled water. TMW will also continue to benefit indirectly from regional conservation efforts and also through MWD's efforts to augment its supplies and improve storage capacities. **Section 5: Reliability Planning** discusses reliability issues and compares the projected water supplies to projected demands for normal, dry, and multiple dry years through 2035.

2.5 ALTERNATE WATER SOURCES

This section provides an overview of alternative water sources (non-potable supplemental supplies) and their potential uses. Alternative water sources including additional recycled water and desalinated seawater may provide a major portion of TMW's supply in the future.

Additional Recycled Water

TMW currently benefits from the use of recycled wastewater purchased from WBMWD as mentioned in the previous section. Additionally, TMW benefits indirectly from regional uses of recycled water in the West Coast Basin and in its service area. As a result of using recycled water since 1995, TMW has identified potential recycled water users in a Recycled Water Master Plan. If the City were to expand its use of recycled water, the City would realize additional benefit.

Graywater

Graywater systems have been used in California to provide a source of water supply for subsurface irrigation and also as a means to reduce overall water use. Graywater consists of water discharged from sinks, bathtubs, dishwashers, and clothes washers. Graywater systems typically consist of an underground tank and pumping system. Graywater is currently legal for subsurface irrigation in the State of California. However, strict regulations, permit requirements, and the high cost of installation have impeded implementation of professional graywater systems. Graywater systems also have potential unintended consequences of undocumented and noncompliant use of graywater discharge. The promotion of graywater systems as a means to reduce the City's overall water use is not recommended since the use of graywater is currently limited to subsurface irrigation and therefore the overall service area-wide reduction in water use (in AF) would be minimal at best. With the recent passage of Senate Bill 1258, however, graywater use is expected to be expanded to include use for toilet flushing, and may have its place as a potential water supply. The City does not currently have a formal program in place to support graywater use.

Desalinated Seawater

Seawater desalination is a process whereby seawater is treated to remove salts and other constituents to develop both potable and non-potable supplies. There are over 10,000 desalination facilities worldwide that produce over 13 million AFY. Desalinated water can add to Southern California's supply reliability by diversifying its water supply sources and mitigating against possible supply reductions due to water shortage conditions. With its Seawater Desalination Program (SDP), the MWD facilitates implementation and provides financial incentives for the development of seawater desalination facilities within its service area.

Currently, WBMWD maintains a temporary ocean-water desalination demonstration plant at SEA LAB in Redondo Beach (see

Figure 2.12). The demonstration project uses limited quantities of full-scale equipment to refine operating parameters and perform additional water quality testing, processing 500,000 gallons of ocean water per day. Roughly 250,000 gallons of drinking-quality water will be produced by the demonstration facility on a daily basis. WBMWD anticipates that a full-scale ocean-water desalination facility could produce 20 million gallons daily, enough to meet the needs of 40,000 South Bay households annually.

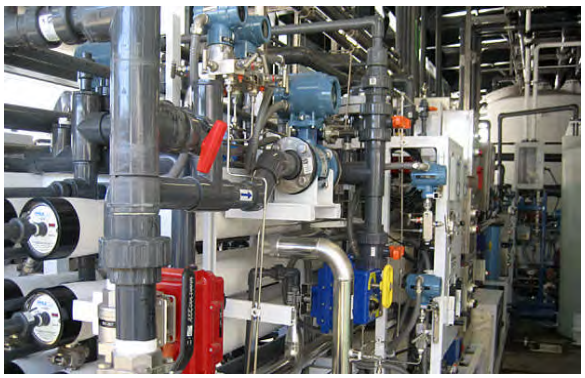

Figure 2.12: WBMWD Desalination Plant

Although the Torrance City boundaries extend to the ocean, that portion of the City is served by California Water Service Company (CWS) and thus an oceanfront facility would not be an option for TMW. Additionally, the economics of building and operating an oceanfront desalinization plant would prohibit its construction in the City. Most oceanfront plants are constructed adjacent to existing power plants, and take advantage of the existing discharge and energy resources of the power plant. If WBMWD develops a fullscale desalination facility, TMW may choose to pruchase desalinated supplies from WBMWD.

Stormwater Recycling in Santa Monica

The City of Santa Monica completed its Santa Monica Urban Runoff Recycling Facility (SMURRF - see **Figure 2.13**) in 2002. The primary objectives of the facility was to eliminate contamination of the Santa Monica Bay caused by urban runoff and to provide cost-effective treatment for producing high-quality water for reuse in landscape irrigation and indoor plumbing. The SMURRF project was funded by City of Santa Monica, City of Los Angeles, State Water Resources Control Board, Metropolitan Water District, federal ISTEA Grant funds and Los Angeles County Proposition "A" Grants and is operated jointly by the cities of Santa Monica and Los Angeles.

Figure 2.13: SMURRF in Santa Monica

The Torrance City boundaries extend to the ocean similar to Santa Monica. However, this portion of the City is served by California Water Service Company (CWS) and thus an oceanfront stromwater treatment facility is not practical for TMW. In addition, the construction and maintenance costs associated with a stormwater recycling plant would prohibit TMW from considering such a facility as a means to provide an alternative water supply.

2.6 TRANSFERS OR EXHCHANGES

TMW owns rights to extract 5,640 AF of groundwater annually. However, the City

currently only uses approximately 1,600 AFY of its adjudicated water rights due to water quality problems and lack of well capacity. As a result, TMW has leased some of its rights to the Roman Catholic Archdiocese of Los Angeles since 2004. In addition, MWD and WRD are exploring exchange and/or transfer options that would benefit the region. TMW maintains four two-way emergency inter-connections to adjacent water purveyor systems. These connections have the ability to transfer approximately 9,900 gpm. There are two 8-inch connections to the City of Lomita, one 8-inch connection to California Water Service Company (CWSC), and one 12-inch connection to the CWSC system. Each has a two-way interconnection, allowing water transfers to and from the City, depending on the emergency situation. However, records show that these connections have not been used recently. There are also two 10-inch one way metered interconnections that can only flow from the City to CWSC.

2.7 PLANNED SUPPLY PROJECTS

The City continually reviews options that have potential to provide its customers with adequate and reliable supplies. Trained staff continues to ensure the City's water quality is safe and the quantity of water supply meets present demands and will meet future needs. The City's planning approach to water supply projects is performed such that projects are implemented in an environmentally and economically responsible manner. TMW consistently coordinates its long-term water shortage planning with MWD.

TMW's water demand within its service area could remain relatively constant over the next 20 years due to minimal growth combined with water use efficiency measures and the potential use of recycled water. Water conservation measures described in **Section 6** and possible increased use of recycled water use described in **Section 8** have the potential to reduce potable demand. Any new water supply projects will be to replace or upgrade existing facilities and capacities rather than to support population growth and new development. The projects that have been identified to improve TMW's water supply reliability and enhance the operations of TMW's facilities and includes distribution system improvements, security improvements, and water production and storage improvements. The improvement projects include:

- **Replacement of Well #6 with Well #9:** Well #6 had reached the end of its service life and was replaced by Well #9. The new Well #9 increases TMW's extraction capacity from 1,500 AFY to 1,800 AFY. However, with the construction of the North Torrance Well Field, Well #9 will produce its full design yield of approximately 2,500 AFY.

- **Walteria and Ben Haggott Reservoir Rehabilitation:** Both reservoirs will be rehabilitated to improve water quality and water circulation.

- **North Torrance Groundwater Well Development Program:** The City is in the planning stage for the development of a well field in north Torrance. A preliminary design report regarding the project was recently completed in April 2011 to define project parameters, evaluate options, assess design considerations and provide cost estimates. Water quality and treatment considerations

will need to be evaluated for prospective well sites as well as modeling to ensure the saline groundwaters do not migrate inward. The City is also investigating several potential sites to increase storage throughout the distribution system. The City will be able to pump up to its full groundwater rights with the construction of the north Torrance wells. It is anticipated that the City will finalize their preliminary design study for this project by the end of 2011 and proceed with initiating project development in 2012.

- **Goldsworthy Desalter Project**: The water Replentnishment District (WRD) has received grant funding from the United States Bureau of Reclaimation (USBR) to conduct a feasibility study for the expansion of the Goldsworthy Desalter Project. It is projected that this study will be completed in early 2012 and this will provide the requisite information to seek potential grant funding for the proposed expansion. The expansion would produce an additional 2,500 AFY of potable water to the City. The project includes additional treatment facilities, a new well, and disposal system. If funding is secured the project is anticipated to be online four years after funding is granted. The well may be designed as an aquifer storage and recovery facility, so that it could also be used for conjunctive use storage. Because funding is uncertain at this time, this project is not included in the projections as a new water supply for the City. It is, however, a potential project for sometime in the future.

- **Well #7 and Well #8**: Due to significant water quality problems, TMW is not currently producing water from either of these facilities. Pilot studies have indicated that the only viable alternative would be reverse osmosis treatment, which is not cost effective. These facilities will remain as a standby emergency water sources for the foreseeable future.

SECTION 3: WATER QUALITY

3.1 WATER QUALITY SUMMARY

In 1974, Congress passed the Safe Drinking Water Act in order to protect public health by regulating the nation's drinking water supply. As required by the Safe Drinking Water Act, TMW provides annual Water Quality Reports to its customers. The quality of water delivered to TMW's customers is directly related to the quality of the supply sources from which TMW obtains its water. Since the majority of TMW's water supply is obtained from MWD, the quality of water within the TMW is closely related to the quality of the supply sources form which MWD obtains its water.

To ensure quality of its water, TMW is concerned with a number of threats to drinking water which include turbidity, microbiological content, organic and inorganic chemical concentration, radionuclide content, and disinfection by product concentration. TMW's efforts ensure that its water supply is pure and drinkable, as indicated by **Figure 3.1** below.

Figure 3.1: Health Standards Protect Drinking Water

The two main sources of TMW's water supply as mentioned in Section 2 are imported water from MWD and groundwater from the West Coast Basin. Since MWD draws the majority of its water from the Colorado River Aqueduct (CRA) and the State Water Project (SWP), the quality of TMW's water supply is closely related to the quality of these two sources.

3.2 QUALITY OF SOURCES

Water received by MWD is treated at five separate treatment plants and tests its water for contaminants. Metropolitan recognizes that water quality is a concern to not only public health but also to their future water supply. Due to these concerns, MWD has identified a number of water quality issues with its two main sources in their 2010 Regional Urban Water Management Plan (RUWMP).

In addition to its imported water, TMW treats groundwater at Well #9 by disinfection and aeroration at the McMaster Park site. The Goldworthy Desalter treats water from a saline well by a reverse osmosis process. The resulting quality of water delivered to TMW's customers is a result of the efforts of both TMW and MWD.

3.3 WATER QUALITY CONCERNS

MWD's two main supply sources have different water quality issues. Water obtained from the Colorado River tends to have high salinity and also has been known to contain harmful metallic elements. Water from the Sacramento-San Joaquin Delta, on the other hand, tends to have high biological loads due to farming activities in the San Joaquin Valley. Water containing high biological loads tends to have higher

treatment costs than water with low biological loads. Since pumping rights to the Colorado River continue to be a debated issue, SWP water quality is an issue of concern. This section describes some of the major water quality issues facing TMW.

General Water Quality Concerns

In nearly every source of water, microbiological contaminants exist which require treatment. Microbiological contaminants (see **Figure 3.2** below) include parasites, bacteria, and viruses which live in surface waters and in groundwater. Most microbiological contaminants have acute health effects which include gastrointestinal and respiratory illnesses.

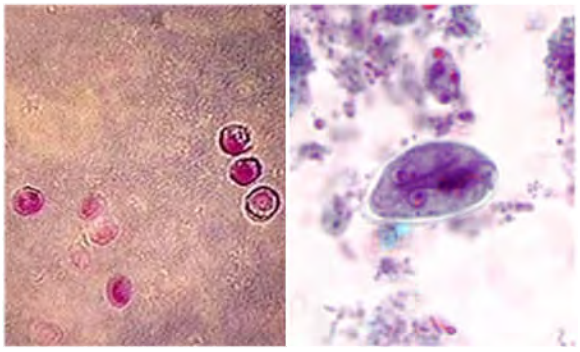

Figure 3.2: Cytosporidium (L) and Giardia (R)

Treatment such as filtration and disinfection removes or destroys microbiological contaminants. Drinking water which is treated to meet EPA requirements is associated with little to no health risks and is considered safe.

Colorado River Water Quality Concerns

Salinity

Water imported from the Colorado River via the Colorado River Aqueduct (CRA) has the highest level of salinity of all of Metropolitan's sources of supply, averaging around 630 mg/L. The salts in the Colorado River system (see **Figure 3.3**) are indigenous and pervasive, mostly resulting from saline sediments in the Basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. To offset these salinity levels, CRA water must be blended (mixed) with lower-salinity water from the SWP to meet MWD's salinity standard of 500 mg/L for blended imported water.

Figure 3.3 Colorado River & Sedimentary Rock

Concern over salinity levels in the Colorado River has existed for many years. To foster interstate cooperation on this issue, the seven basin states formed the Colorado River Basin Salinity Control Forum (Forum).

In 1975, the Forum proposed, the states adopted, and the U. S. Environmental Protection Agency (USEPA) approved water quality standards, including numeric criteria and a plan for controlling salinity increases. The standards require that the plan ensure that the flow-weighted average annual salinity remain at or below the 1972 levels, while the Basin states continue to develop their 1922 Colorado River Compact-apportioned water supply. The Forum selected three stations on the main stream of the lower Colorado River as appropriate points to measure the river's salinity. These stations and numeric criteria are (1) below Hoover Dam, 723 mg/l; (2) below Parker

Dam, 747 mg/l; and (3) at Imperial Dam, 879 mg/l. The numeric criteria are flow-weighted average annual salinity values.

By some estimates, concentrations of salts in the Colorado River cause approximately $353 million in quantified damages in the lower Colorado River Basin each year. To mitigate these issues, salinity control programs have been implemented to reduce the salinity of Colorado River Water. Salinity control programs have proven to be very successful and cost-effective in reducing salinity levels of water in the CRA. Salinity control projects have reduced salinity concentrations of Colorado River water on average by over 100 mg/L or $264 million per year (2005 dollars) in avoided damages.

Perchlorate

Perchlorate is both a naturally occurring and manmade contaminant increasingly found in groundwater, surface water and soil. Perchlorate is known to inhibit the thyroid's ability to produce growth and development hormones. Perchlorate was first detected in Colorado River water in June of 1997 and was traced back to the Las Vegas Wash shown to the left in **Figure 3.4** below.

Figure 3.4 Las Vegas Wash

Perchlorate, unlike other contaminants, does not tend to interact readily with the soil and also does not degrade in natural environments. Conventional drinking water treatment (which is used at MWD's water treatment facilities) is not effective in removing perchlorate. Mitigation efforts are the most viable option for removing perchlorate from drinking water. To facilitate perchlorate remediation of the Colorado River, MWD and other federal and state agencies partnered to reduce and prevent perchlorate contamination issues in the Colorado River. In 1998, these mitigation efforts began and have been successful at reducing perchlorate loading into the Las Vegas Wash from 1,000 lbs/day to 60-90 lbs/day since 2007.

Although the California Department of Public Health has established a perchlorate maximum contaminant level (MCL) of 6 parts per billion (µg/L), no federal drinking water standard exists. MWD routinely monitors perchlorate at 34 locations within its system and levels currently remain at non-detectable levels (below 2 µg/L). MWD has not detected perchlorate in the SWP since monitoring began in 1997.

Uranium

Uranium is a naturally occurring radioactive material that has known cancer risks. Uranium can infiltrate a water source either directly or indirectly through groundwater seepage. Due to past uranium mill activities near the Colorado River, a 16-ton pile of uranium mill tailings exists that has the potential for contamination. Ongoing remediation actions have been successful at removing the tailings and contaminated groundwater from the site. Although uranium levels measured at MWD's intake are below State MCL levels, MWD has only limited ability to remove uranium through traditional treatment and thus mitigation methods are crucial to avoiding uranium contamination.

Bay Delta Water Quality Concerns

Total Organic Carbon and Bromide

Water containing high levels of Total Organic Carbon and Bromide, and treated with disinfectants such as chlorine or ozone, can lead to the production of Disinfection Byproducts (DBPs). DBPs are known to cause certain cancers and pose a significant concern to the City's imported water supply. The EPA currently regulates DBPs with strict standards. MWD manages DBP concentration by participating in the CALFED Bay-Delta Program to safeguard SWP source water and also by providing advanced treatment operations.

Nutrients (Algal Productivity)

Elevated nutrient levels in the SWP can adversely affect the TMW's imported water quality by stimulating biomass growth such as algae and aquatic weeds (see **Figure 3.5** below). Nutrients can also provide a source of food leading to the growth of nuisance biological species. This can lead to taste and odor concerns and can impede normal treatment operations.

Figure 3.5: Algal Growth in State Water Project

MWD offsets the nutrient rich SWP water by blending it with CRA water in MWD's blend reservoirs. Although nutrient loading is a concern, MWD does not expect there to be any effects on its supplies from the SWP.

Arsenic

Arsenic is a naturally occurring element found in rocks, soil, water, and air. It is used in wood preservatives, alloying agents, certain agricultural applications, semi-conductors, paints, dyes, and soaps. Arsenic can get into water from the natural erosion of rocks, dissolution of ores and minerals, runoff from agricultural fields, and discharges from industrial processes. Long-term exposure to elevated levels of arsenic in drinking water has been linked to certain cancers, skin pigmentation changes, and hyperkeratosis (skin thickening).

The MCL for arsenic in domestic water supplies was lowered to 10 µg/L, with an effective date of January 2006 in the federal regulations, and an effective date of November 2008 in the California regulations. The standard impacts both groundwater and surface water supplies. Historically, Metropolitan's water supplies have had low levels of this contaminant and would not require treatment changes or capital investment to comply with this new standard.

Other Imported Water Quality Concerns

As the technology to discover contaminants advances, the City faces ongoing threats to its drinking water as new contaminants are discovered and existing contaminants are more readily detected. Some of the current contaminants not previously mentioned which pose a threat to TMW's imported water supplies include, but are not limited to: Chromium VI, N-nitrosodimethylamine (NDMA), and Pharmaceuticals & Personal Care Products (PPCPs). Continued mitigation efforts may, however, lead to a decrease in the threat level of these contaminants, as has been demonstrated through past mitigation efforts.

Local Water Storage Concerns

For the past three years, quagga mussels have become a significant threat to the water quality of regional storage reservoirs fed by the Colorado River Aqueduct. Since 1989 these mussel infestations have been a nuisance to the Great Lakes Region and have incurred costs of over $5 billion to industries and communities that rely on water from the lakes. It is believed that the mussels first arrived in U.S. waters from foreign ships originating from Eastern Europe. In 2007 they were discovered at various locations along the Colorado River, such as Lake Havasu, and in various local storage reservoirs, such as Lake Matthews (see **Figure 3.6** below). Although the introduction of these species into drinking water supplies does not typically result in violation of drinking water standards, invasive mussel infestations can adversely impact aquatic environments and threaten water delivery systems.

Figure 3.6: Lake Mathews (terminus of CRA)

The quagga mussel is related to the better known zebra mussel which has been plaguing the Great Lakes region. An adult quagga shell measures approximately 0.8 in wide, a size comparable to a thumbnail. The quagga mussel can be found on both hard and soft surfaces in freshwater, from the surface to more than 400 feet in depth.

Quagga mussels can adversely impact water supply systems by clogging filters and pipes (see **Figure 3.7** below) used to convey water. In addition, they can also adversely affect water quality by producing unpleasant odor and taste and can eventually render lakes more susceptible to deleterious algal blooms. Algal blooms can lead to the proliferation of nuisance biological species which can further impact the quality of water. Poor water quality can in turn affect the reliability and affordability of water if the problem remains unmitigated.

Figure 3.7: Quagga Mussels On Pipe

Current drinking water and environmental standards limit the options available for mitigation to MWD and other affected agencies in Southern California. To mitigate problems associated with quagga mussels, MWD developed a Quagga Mussel Control Plan (QMCP), which entails a three phase implementation strategy to mitigate the problems associated with the quagga mussels. Current mitigation efforts range include changing the environmental conditions to create antagonistic environments and promoting the use of biological controls. MWD intends to analyze the effectiveness of current mitigation strategies in order to design future infrastructure improvements for the long-term management of quagga mussels.

Summary of Imported Water Quality

Although MWD water meets all regulatory requirements, MWD understands the need for strong testing and quality assurance for its customers. To achieve this, MWD maintains five treatment plants which serve Southern California. Three of the five treatment plants, including the Weymouth Treatment Plant shown in **Figure 3.8** below, blend a mix of water from both sources to achieve maximum water quality. MWD's state-of the-art laboratories also ensure the safety of its water and to maintain compliance with federal and state water quality regulations. In addition to the central laboratory, there are five satellite facilities at MWD's water treatment plants.

Figure 3.8: Water Treatment at MWD's F.E. Weymouth Treatment Plant

West Coast Basin Groundwater Quality

In addition to imported water quality concerns, TMW is also concerned with groundwater quality pumped from the West Coast Basin. In general, groundwater in the main producing aquifers of the basins is of good quality with average total dissolved solids (TDS) concentrations around 500 mg/L. Localized areas of marginal to poor water quality exist, primarily on the basin margins and in the shallower and deeper aquifers impacted by seawater intrusion.

As part of the Basin's groundwater quality monitoring, WRD and the U.S. Geological Survey (USGS) began a cooperative study in 1995 to improve the understanding of the geohydrology and geochemistry of Central and West Coast Basins. Out of this effort

came WRD's geographic information system (GIS) and the Regional Groundwater Monitoring Program. Twenty-one depth-specific, nested monitoring wells located throughout the basin allow water quality and groundwater levels to be evaluated on an aquifer-specific basis. Regional Groundwater Monitoring Reports are published by WRD for each water year. Constituents monitored include: TDS, iron, manganese, nitrate, TCE, PCE, arsenic, chromium including hexavalent chromium, MTBE, and perchlorate.

Constituents of Concern

Most production wells in the West Coast Basin have TDS concentrations less than 750 mg/L with a range of 150 to 13,600 mg/L in the monitoring wells measured by WRD. Higher TDS concentrations found in production wells in Torrance/Hawthorne area and in monitoring wells within the brackish plume.

Organic constituents of concern (TCE, PCE, or perchlorate) were not detected in concentrations above applicable MCLs in the West Coast Basin. Neither TCE nor PCE were detected in any production well in the West Coast Basin. TCE was detected in three monitoring wells and PCE was detected in one monitoring well. Nitrate (as nitrogen) concentrations range from non-detect to 12 mg/L in the monitoring wells in the West Coast Basin.. Production wells have nitrate concentrations less than 3 mg/L. Iron and manganese were detected in concentrations above the secondary MCL for these constituents in both monitoring wells and production wells in the basin. Nearly one-third of all production wells in northwestern portion of West Coast Basin have concentrations that exceed secondary MCL for iron. Seventeen of 30 production wells tested had concentrations above secondary MCL for manganese. **Table 3.1** summarizes the Basin Groundwater Constituents of concern:

Table 3.1
West Coast Groundwater Basin
Constituents of Concern

Constituent	Units	Range	Description
TDS Secondary MCL = 500	mg/L	150 to 13,600 Average: 500	Most production wells have TDS less than 750 mg/L. Higher TDS concentrations found in production wells in Torrance/Hawthorne area and in monitoring wells within saline plume.
VOCs **(TCE and PCE)** Primary MCL for TCE = 5 Primary MCL for PCE = 5	µg/L	ND to 18 for TCE ND to 0.8 for PCE	TCE nor PCE not detected in production wells. TCE detected in three monitoring wells. PCE detected in one monitoring well.
Perchlorate Notification level = 6	µg/L	Data not available	Detected in three monitoring wells below action level in shallow zones
Nitrate (as N) Primary MCL = 10	mg/L	ND to 12 mg/L	Higher concentrations tend to be limited to the uppermost zones and are likely due to localized infiltration and leaching. Production wells have concentrations less than three mg/L.

Table 3.1 (cont.)
West Coast Groundwater Basin
Constituents of Concern

Constituent	Units	Range	Description
Iron and manganese Secondary MCL for iron: 0.3 Secondary MCL for Mn: 0.05	mg/L	ND to 1.2 for iron and manganese	Nearly 1/3 of all production wells in northwestern portion of West Coast Basin exceed secondary MCL for iron. 17 of 30 production wells tested had concentrations above secondary MCL for manganese
Chloride Secondary MCL = 500	mg/L	5.8 to 6,180 mg/L	Chloride concentrations exceed chloride MCL in five of 15 nested monitoring wells due to seawater intrusion. One production well had concentrations above MCL.

Other Special Interest Constituents

In addition to the above constituents, WRD has identified special interest constituents including arsenic, hexavalent chromium, MTBE, total organic carbon, apparent color, and perchlorate as additional water quality issues.

Arsenic

As of January 2006, the federal arsenic MCL for domestic water supplies is 10 ug/L. Three monitoring wells have had past arsenic concentrations between 10 and 50 ug/L and one monitoring well had an arsenic concentration of 68 ug/L.

Hexavalent Chromium

Hexavalent chromium, or chromium 6, is an oxidized form of chromium 3 that is a known carcinogen when inhaled. Currently, the MCL for all forms of chromium is 50 ug/L. Hexavalent chromium was not detected in any of the production wells in the Basin.

Methyl Tertiary-Butyl Ether (MTBE)

The health effects of MTBE are uncertain. The EPA currently classifies MTBE as a possible human carcinogen. The MCL for MTBE is 13 ug/L. The WRD monitoring wells have not shown detection of MTBE.

Total Organic Carbon

Total organic carbon is the measure of the organics in water and provides an indication of the potential formation of disinfectant\ byproducts. There is no MCL for total organic carbon; however, seven of the 15 production wells tested greater then 5 mg/L for total organic carbon.

Apparent Color

Although apparent color in groundwater is not harmful, an MCL of 15 apparent color units has been established for aesthetic reasons. City Wells #7 and #8 have been observed to produce excessive water color. These wells have been taken out of service due to various water quality concerns.

Perchlorate

As of 2004, the public health goal for perchlorate ais 6 ug/L. To date, however, DHS has not set a regulatory drinking water standard. Perchlorate has been detected in

three monitoring wells in the Basin at levels below the Public Health Goal.

Saline Water Intrusion

A plume of brackish saline water was trapped east of the protective seawater intrusion barriers that were constructed beginning in the 1960's to prevent the further migration of seawater into fresh water aquifers in the West Coast Basin. Although the current barriers are very effective in preventing additional intrusion of seawater into the basin, the trapped plume that could not be contained by the barrier continues to migrate through the basin primarily affecting local groundwater supplies in the beach cities and parts of Torrance. The further spreading of saline water from this plume is a major concern of all water purveyors in the West Coast Basin because potable water generally cannot exceed 500 ppm (parts per million) of chloride.

3.4 WATER QUALITY EFFECTS

The previous section summarized the general water quality issues for TMW's water supplies. TMW continues to monitor its groundwater wells for the first indication of problems as part of their water management strategy. TMW's groundwater management strategy includes the following:

- Well #7 is an inactive well and has been out of service since October 1998 due to increased taste and odor problems and high total organic carbon levels in the well water. Naturally occurring ammonia is present in the well water. The well also contains iron, manganese, and hydrogen sulfide. Pilot studies have indicated that the only viable alternative would be reverse osmosis treatment, which is not cost effective.
- Well #8 was drilled in 1998 and has not yet been equipped. Because it was drilled near Well #7, there is concern over the well's long-term water quality, which is similar to Well #7.
- Well #6 had been in service since 1965 and was recently taken out service and replaced by new Well #9 at the McMaster Park site. TMW uses choloromines for disinfection treatment of the groundwater produced from Well #9 in order to reduce trihalomethane formation in the distribution system, and so that the type of residual disinfectant would be compatible with chloromines in imported water from MWD.
- The North Torrance Groundwater well development project will include treatment for iron and manganese with space available for fluoridation and future treatment for possible disinfection by products and total dissolved solids.

Due to the mitigation actions undertaken by MWD and TMW, TMW staff does not anticipate any reductions in its water supplies due to water quality issues. Future regulatory changes enacted by the EPA and/or the State legislature will be met through additional mitigation actions in order to meet the standards and to maintain water supply to TMW's customers. With the exception of possible saline ground water migration in the West Coast Basin, TMW does not expect water quality to be a major factor in its supply reliability considerations.

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SECTION 4: WATER DEMANDS

4.1 INTRODUCTION

Water use within TMW's service area is variable and depends on a number of factors which range from irrigation to industrial use and from inefficient plumbing to water losses. Changes in residential plumbing fixtures and customer usage habits can significantly affect water usage for most agencies. This section explores the water usage trends within the City and quantifies total usage per customer type. In addition, the provisions of the Water Conservation Act of 2009 (SBx7-7) are explored in detail.

4.2 CURRENT CITY WATER NEEDS

The City of Torrance, like many other cities of Southern California, began as a suburban community with some agricultural and industrial uses and throughout the years has transformed into an urban City. After the City was incorporated, the City's population growth was spurred by the development of industrial and commercial job opportunities, which were sustained by a reliable source of imported water purchased from MWD in addition to local groundwater supplies.

The City's population growth has stabilized over the past 20 years and growth is currently under 0.5 percent annually. The City is approaching ultimate "built-out" conditions with remaining expected future water demands primarily attributable to possible land use changes in residential densities, redevelopment, and in-fill land development projects. Due to this slowed growth and increasing conservation efforts, the City's water use over the past 20 years has been fairly consistent and recent total water consumption throughout the City reported for fiscal year 2010 is actually less than total water consumption reported for fiscal year 2005. Due to the relatively consistent water demand and TMW's planned water diversification program, local groundwater sources and imported supply capacity put the City in a position of providing a reliable source of quality water for its customers.

Figure 4.1: Residential Irrigation

TMW supports water conservation while maintaining the beauty of its community parks, schools, and recreational facilities both in the private and in the public sector. Since the City is zoned mainly for residential use and the majority of residential water consumption in the City is used for non-personal purposes (i.e. irrigation, car washing, etc), the City has a significant number of residential lots which require consistent irrigation (see **Figure 4.1** above) to maintain landscapes. Of the water used for personal purposes, the majority of water consumed is attributable to toilet flushing and clothes washing.

In order to maintain civic pride and a sense of community, City parks and other City right of ways (medians, etc.) require consistent irrigation. To prevent water

waste, TMW follows a irrigation schedule that limits the length of irrigation to avoid overspray runoff and also eliminates evapotranspiration from daytime watering.

In the commercial and industrial sectors, water needs vary as customers range from restaurants to offices and from retail stores to large refineries. Office buildings which include Toyota Motor Sales and American Honda Motor Company require significantly less water than industrial customers such as ExxonMobil (see **Figure 4.2** below). The City's image as a balanced industrial and commercial friendly City is due in part to its dedication to conserving its resources while maintaining the beauty of its community parks, schools, and recreational facilities both in the private and in the public sector.

Figure 4.2: ExxonMobil Refinery

Overall water use characteristics within TMW's service area reflect slightly lower than average regional water use characteristics within Southern California.

4.3 HISTORIC WATER DEMAND

Water demands within TMW's service area over the past five years are met by imported water from MWD, groundwater from the West Coast Basin, desalted groundwater from the West Coast Basin via the Goldsworthy Desalter, and recycled water from the ELWRF. Total annual potable water demand, including system loses, since 2005 has ranged from about 19,000 AF to 24,000 AF as shown below in **Table 4.1:**

Table 4.1
Historic Water Production: FY 2006-2010

Year	Potable (AF)	Recycled (AF)
2010	18,758	6,445
2009	20,672	5,876
2008	22,064	6,492
2007	23,990	6,059
2006	23,117	6,419
Average:	**21,720**	**6,258**

As indicated by **Table 4.1** above, water use fluctuates each year which is related to climatologic and economic conditions.

4.4 WATER USE STATISTICS

The City maintains records of water consumption and bills its customers on a bi-monthly basis for its water service, with the exception of the largest 600 accounts, who are billed on a monthly basis. The City maintains approximately 26,500 service connections (potable and non-potable) with a mixture of residential, commercial, industrial, agricultural, fire protection and landscape accounts. Approximately 88 percent of the potable service connections are either single family or multi-family residential. Commercial, industrial, and institutional accounts comprise about eight percent of the total potable accounts. Miscellaneous or "other" accounts comprise the balance of the potable connections. Non-potable accounts utilize recycled water use for landscape irrigation and industrial use. The City maintains about 31 recycled water accounts that are used for landscape purposes. The City's primary industrial recycled water customer,

ExxonMobil, uses recycled water for its refinery process, saving the City a significant portion of potable water. **Tables 4.2** and **4.3** below, show the number of service connections and the total water consumption per sector from 2006 through 2010.

Table 4.2
Number of Service Connections 2006-2010

Sector	2006	2007	2008	2009	2010
Single Family Residential	20,286	20,711	20,790	20,809	20,842
Multi-Family Residential	2,370	2,450	2,467	2,466	2,477
Commercial/Institutional	1,724	1,737	1,790	1,782	1,777
Industrial	277	276	271	268	274
Landscape Irrigation	373	380	385	389	389
Other	708	725	716	737	740
Agricultural	6	6	11	6	5
Wholesale	3	3	4	4	4
Total Potable Connections:	**25,747**	**26,288**	**26,434**	**26,461**	**26,508**
Industrial Recycled	1	1	1	1	1
Landscape Irrigation Recycled	23	29	30	31	31
Total Recycled Connections:	**24**	**30**	**31**	**32**	**32**
Total Connections:	**25,771**	**26,318**	**26,465**	**26,493**	**26,540**

Table 4.3
Water Sales 2006-2010 (AF)

Sector	2006	2007	2008	2009	2010	Avg. (%)
Single Family Residential	7,743	8,304	7,971	7,713	6,963	28.0%
Multi-Family Residential	3,910	4,110	4,084	3,933	3,794	14.4%
Commercial/Institutional	3,148	3,461	3,541	3,145	2,857	11.7%
Industrial	3,393	3,251	3,723	3,705	2,859	12.3%
Landscape Irrigation	906	1,034	1,023	950	810	3.4%
Other	1,123	1,040	1,120	1,193	155	3.4%
Agricultural	19	22	21	25	27	0.1%
Wholesale	2,005	1,515	682	821	571	4.1%
Total Potable Sales	**22,248**	**22,737**	**22,164**	**21,486**	**18,035**	**77.3%**
Industrial Recycled	6,156	5,774	6,180	5,599	6,173	21.7%
Landscape Irrigation Recycled	253	285	311	278	272	1.0%
Total Recycled Sales	**6,409**	**6,059**	**6,491**	**5,876**	**6,445**	**22.7%**
Total Water Sales	**28,656**	**28,796**	**28,656**	**27,362**	**24,480**	**100.0%**

4.5 WATER CONSERVATION ACT

SBx7-7 Background

Due to reductions of water in the San Joaquin Delta, the Legislature drafted the Water Conservation Act of 2009 (SBx7-7) to protect statewide water sources. The new legislation called for a 20% reduction in urban water use in California by the year 2020. The new legislation amended the water code to call for reporting changes in the 2010 Urban Water Management Plans and allows the Department of Water Resources (DWR) to enforce compliance to the new water use standards. The new reporting requirements allow provisions for agencies located within different Hydrologic Regions to satisfy the requirements of the legislation.

In addition to an overall statewide 20% water use reduction, the objective of SBx7-7 is to reduce water use in within each hydrologic region in accordance with the agricultural and urban water needs of each region. Currently, the Department of Water Resources (DWR) recognizes 10 separate hydrologic regions in California as shown in **Figure 4.3** below:

Figure 4.3: California's 2020 Water Conservation Goals

Each hydrologic region has been established for planning purposes and corresponds to the State's major drainage areas. The City of Torrance is located in the South Coast Hydrologic Region (HR), which includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara Counties. The South Coast HR is shown below in **Figure 4.4**. Per capita water use, measured in gallons per capita per day (GPCD), in the South Coast HR varies between different water agencies, depending on the geographic and economic conditions of the agency's service area. Regions with more affluence, typically consume more water and therefore have higher per capita water use numbers. The South Coast Hydrologic Region has an overall baseline per capita water use of 180 GPCD and DWR has established a regional target of 149 GPCD for the region as a compliance target to satisfy SBx7-7 legislation

SBx7-7 Methodologies

To satisfy the provisions of SBx7-7, TMW must establish a per capita water use target for the year 2020 as well as a 2015 interim target. DWR has provided guidelines for determining these targets in its Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use and also in the 2010 UWMP Guidebook (Section D). TMW's baseline water use is based on historic water use and is determined by the procedure on the following page in **Figure 4.5**. Likewise, TMW is responsible for determining a five-

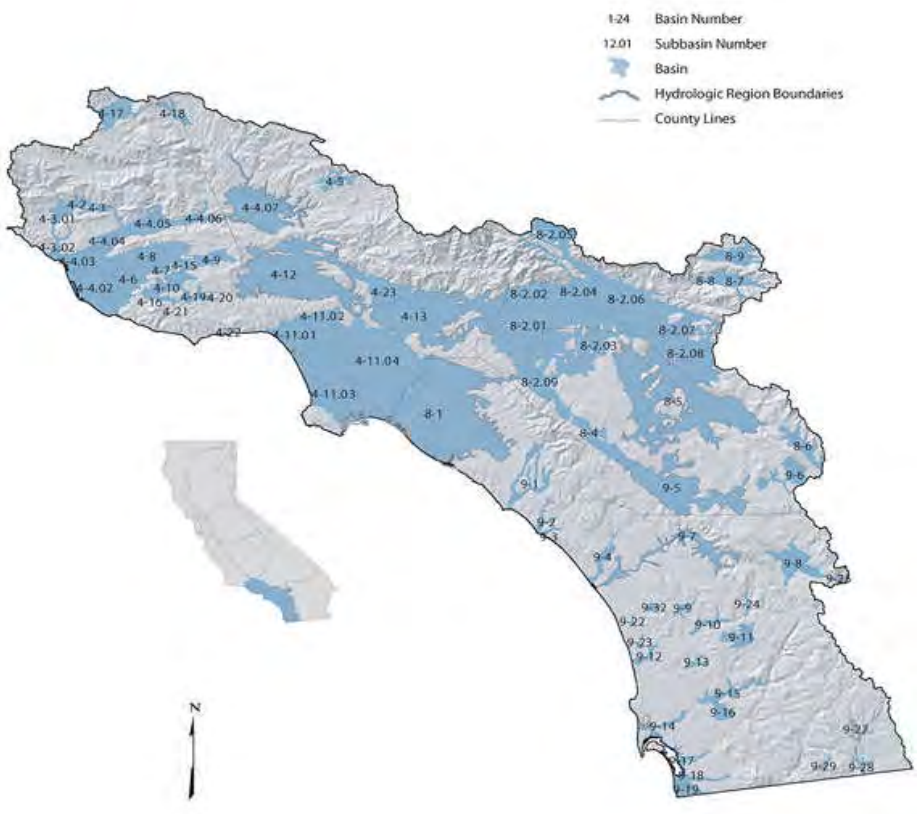

Figure 4.4: South Coast Hydrologic Region

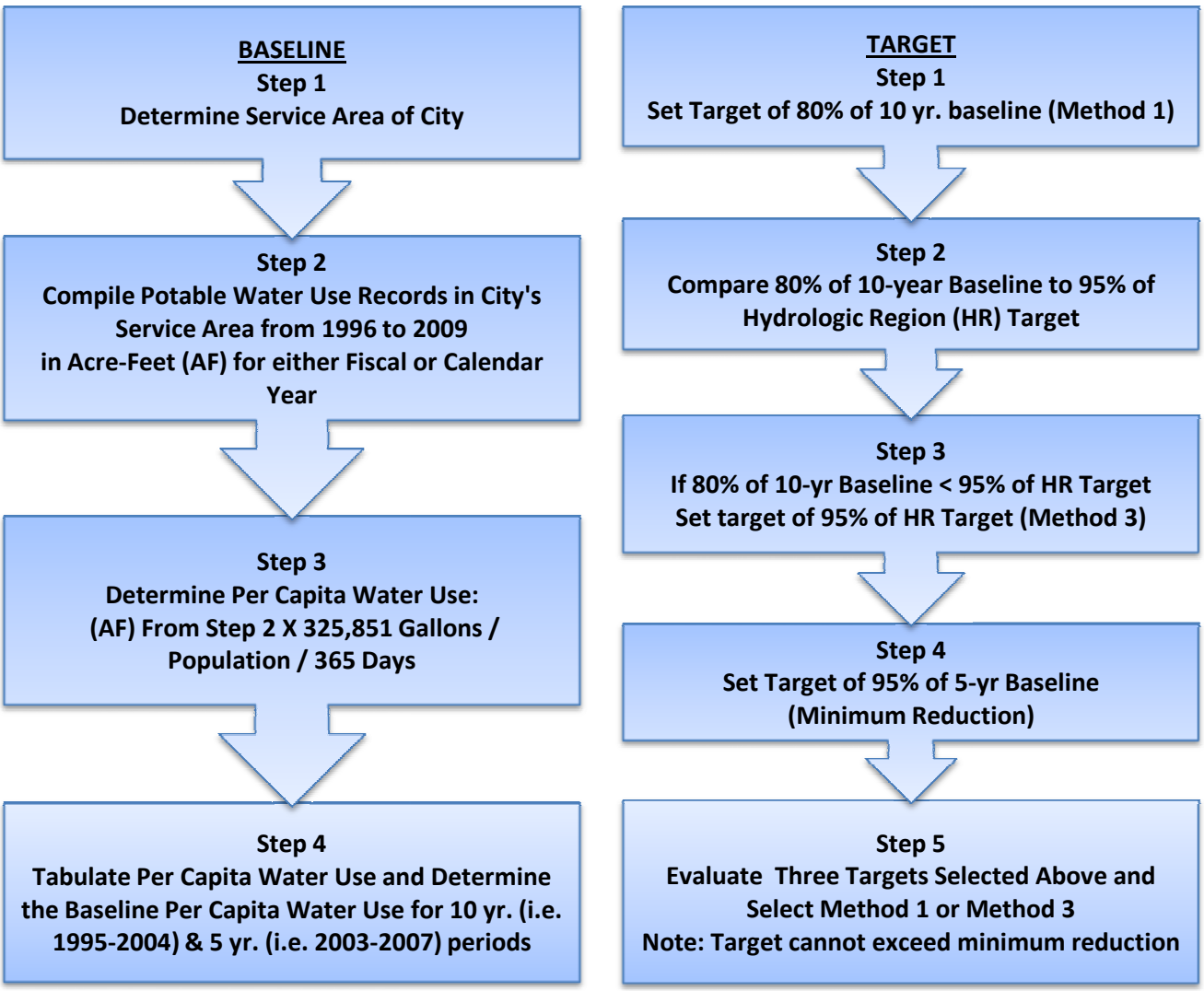

Figure 4.5: Procedure for Determining Baseline & 2020 Target Per Capita Water Use

year baseline water use in accordance with DWR's guidelines. The *Methodologies* guidebook makes provisions which allow a water supplier to meet the target requirements by achieving any one of a number of target requirements, provided that the water supplier's per capita water use is low enough relative to the region within which it supplies water.

The basic options include a minimum reduction requirement of 5% (Water Code § 10620), a 5% Reduction from the Regional (South Coast HR) target (Water Code § 10608.20 (b) (3)), or a strict 20% reduction. These options have been established in order to avoid placing any undue hardship on water agencies that have already been implementing water conservation measures for some time. The basic procedure for determining the applicable water reduction target is illustrated by **Figure 4.5** above. If an agency's 10-year baseline is slightly higher than the Hydrologic Region's Target, that agency still must achieve a 5% reduction from its 5-yr. baseline. If an agency has a per capita water use of 100 GPCD or less, that agency will not have to adhere to any reduction targets since the agency is already water efficient.

SBx7-7 Targets

Due to the options available to water agencies, some neighboring agencies within the South Coast HR with moderate water usages will not have to adhere to stringent reduction requirements. **Table 4.4** below shows an example of these options available to the City of Los Angeles:

Table 4.4
Reduction Example for Los Angeles
(10-yr. Baseline = 150.6 GPCD)

Min. Reduction Requirement (5% of 5-year baseline) (10608.22)	20% Target (10608.20) (b)(1)	5% Reduction from Regional Target (10608.20) (b)(3)
143.07	120.5	141.5
2020 Per Capita Target:		**141.5**
Interim (2015) Target:		**146.1**

As indicated by the above table, the City of Los Angeles cannot select a minimum reduction requirement of 143.07 GPCD (5% from its baseline) as this amount is greater than 141.5 GPCD (5% reduction from the South Coast HR's regional target). However, since Los Angeles's 20% reduction target (120.5 GPCD) is less than the minimum reduction requirement that is required by DWR (141.5 GPCD), it is feasible to select 141.5 GPCD as its 2020 water use target.

Like the City of Los Angeles, water consumption quantities in TMW's service area are moderate due to conservation awareness and a commitment to efficient water use. This indicates that TMW's options will not be limited within the provisions of SBx7-7. TMW's 10-yr. and 5-yr. baselines were determined by the sum of potable supplies into the system minus exemptions from process water and half of water produced from Well #6 and the Goldsworthy Desalter. **Table 4.5** lists TMW's net potable water use for fiscal years 2001-2010**:**

Table 4.5
Torrance Municipal Water
SBx7-7 Baseline GPCPD Water Use

Fiscal Year	SBx7-7 Potable Water Use* (AF)	Per Capita (GPCD)
2010	15,193	132
2009	16,960	147
2008	17,460	153
2007	18,719	165
2006	18,002	159
2005	17,590	156
2004	17,507	156
2003	19,347	174
2002	18,839	170
2001	19,184	174
10 yr. Baseline (FY 01-10) (SB7: 10608.20)		**159**
5 yr. Baseline (FY 06-10) (SB7: 10608.22)		**151**
South Coast HR:		**149**

*See Appendix E for breakdown of potable water use

In order to determine the correct compliance target, TMW's baseline water use will be compared to the regional compliance target as in the Los Angeles example in order to determine the applicable reduction amounts per the SBx7-7 additions to the water code. The legal stipulations applicable to TMW and

the required target to be enforced by DWR is shown below in **Table 4.6**:

Table 4.6
Torrance Municipal Water
SBx7-7 2020 Water Use Targets

Min. Reduction Requirement (10608.22)	20% Target (10608.20) (b)(1)	5% Reduction from Regional Target (10608.20) (b)(3)
143	127	141.5
2020 Per Capita Target:		**141.5**
Interim (2015) Target:		**150**
Fiscal Year 2010:		**132**

As indicated in Table 4.6, TMW can select a 2020 target of 141.5. 141.5 is 95 percent of the regional target. Therefore, TMW is in compliance with 10608.22. In addition, since TMW's 20% reduction target (127 GPCD) exceeds 141.5 GPCD, it is feasible for TMW to select 141.5 GPCD as its 2020 water use target. Therefore, TMW's compliance target for per capita water consumption is 141.5 GPCD in accordance with Section (10608.20)(b)(3) of the Water Code.

Although the requirements of SBx7-7 seem stringent, it is noteworthy to mention that TMW has seen an increase in water efficiency from 2001-2010. This is due in part to a greater achievement of conservation measures, saturation of water-saving plumbing fixtures, and overall water conservation awareness.

Methods to Achieve SBx7-7 Target

Through adherence to conservation measures, the City can participate in Statewide efforts to conserve Sacramento-San Joaquin Bay-Delta Water and to protect the ecological habitat of the region. Although ecological motives are controversial, ensuring a reliable supply of water for human use is a top priority without controversy. Through conservation measures and the use of renewable, local groundwater supplies, the City can reduce demand for Bay-Delta water and preserve the natural habitats as shown in **Figure 4.6**.

Figure 4.6: Bay-Delta Water Must Be Preserved

TMW understands the unique needs of its customers and also the importance of efficient water use. As a result, TMW will utilize management strategies specific to the needs of its residents. The methods to be used in achieving its 2020 reduction requirements, include, but are not limited to the Conservation Measures described in **Section 6**. In addition, TMW may enact additional water use restrictions in accordance with the City's Water Conservation Program (Ordinance 3717). With increased public awareness of SBx7-7 requirements, it is likely that the public will begin to understand the importance of water conservation and will begin to use water more efficiently.

4.6 PROJECTED WATER USE

Future water use projections must consider significant factors on water demand, such as development and/or redevelopment, and

climate patterns, among other less significant factors which affect water demand. Although redevelopment is expected to be an ongoing process, it is not expected to significantly impact water use since the City is already in a "built-out" condition. Rainfall, however, will continue to be a major influence on demand as drought conditions will increase demand at a time when these supplies are limited and may therefore result in water use restrictions in accordance with the City's Water Conservation Program (Ordinance 3717). However, recent projections by TMW indicate the potable water consumption may decline slightly even with modest growth in service connections and population due to active and passive conservation. For planning purposes, TMW's projected water use based on a consumption rate of 172 GPCD (see Table E-1 in Appendix E) for 2015-2035 is broken down by sector in **Table 4.7**. The residential sector includes low-income housing units as the latest Housing Element for the City lists 234 low and very low income housing units to meet the City's Housing Needs Assessment. The estimated residential per unit water demand is 0.78 acre-feet/unit/year and thus 183 acre-feet/year is needed to supply these projected lower income housing units. These water demands are included in future water demand projections for single and multi-family homes listed in **Table 4.7** below:

Table 4.7
Projected Water Use By Sector (AF)

Sector	2010	2015	2020	2025	2030	2035
Single Family Residential	6,963	7,423	7,606	7,890	8,040	8,220
Multi-Family Residential	3,794	4,045	4,145	4,299	4,381	4,479
Commercial/Institutional	2,857	3,046	3,121	3,237	3,299	3,373
Industrial	2,859	3,048	3,123	3,240	3,301	3,375
Landscape Irrigation	810	864	885	918	935	956
Other	155	165	169	176	179	183
Agricultural	27	29	29	31	31	32
Wholesale	571	609	624	647	659	674
Total Potable:	**18,036**	**19,226**	**19,702**	**20,437**	**20,824**	**21,292**
Industrial Recycled	6,173	6,581	6,743	6,995	7,127	7,288
Landscape Irrigation Recycled	272	290	297	308	314	321
Total Recycled	**6,445**	**6,871**	**7,041**	**7,303**	**7,442**	**7,609**
Total Water Sales:	**24,481**	**26,097**	**26,742**	**27,740**	**28,265**	**28,900**
System losses*	722	771	790	819	835	854
Total Water Consumption	**25,203**	**26,868**	**27,532**	**28,559**	**29,100**	**29,754**

*System losses are expected to remain below 5% due to TMW's aggressive maintenance and metering policies.

Based on the data provided in **Table 4.7**, the projected potable demands under the consumption rate of 172 GPCD can be met through 2035 by TMW's anticipated local supply capacity based on a Tier 1 limit of 20,967 from MWD and production capacities of up to 5,640 AFY and 2,400 AFY from its wells and Goldsworthy Desalter, respectively. It is likely that the City may be able to use recycled water to meet some potable demands which can accept recycled water in lieu of potable water in accordance with the projected and potential recycled water users listed in **Tables 8.3** and **8.5** in **Section 8**. Demand and Supply projections are compared and included as part of the City's reliability analysis in **Section 5: Reliability Planning**.

SECTION 5: RELIABILITY PLANNING

5.1 INTRODUCTION

Drought conditions continue to be a critical issue for Southern California's water supply. As the population of Southern California continues to increase and as environmental regulations restrict imported and local water supplies, it is important that each agency manage its water consumption in the face of drought. Even during times of seasonal drought, each agency ought to anticipate a surplus of supply. This can be accomplished through conservation and supply augmentation, and additionally through prohibitions under penalty of law during times of seasonal or catastrophic shortage in accordance with local ordinances.

This section discusses local and regional efforts to ensure a reliable supply of water and compares projected supply to projected demand. Demand and supply projections are provided in Tables 5.5- 5.11.

5.2 HISTORIC DROUGHTS

Climate data has been recorded in California since 1858. Since then, California has experienced several periods of severe drought: 1928-34, 1976-77 and 1987-91, and most recently in 2007-2009 (see **Figure 5.1**). California has also experienced several periods of less severe drought. The year 1977 is considered to be the driest year of record in the Four Rivers Basin by DWR. These rivers flow into the Delta and are the source of water for the SWP. Southern California sustained few adverse impacts from the 1976-77 drought, but the 1987-91 drought created considerably more concern.

As a result of previous droughts, the State legislature has enacted, among other things, the Urban Water Management Planning Act, which requires the preparation of this plan. Subsequent amendments to the Act have been made to ensure the plans are responsive to drought management. In 1991. several water agencies came together to form the California Urban Water Conservation Council (CUWCC) to manage the impacts of drought through the promotion of water conservation.

Figure 5.1: 2007-2009 Drought (Lake Oroville)

The recent drought of 2007-2009 has resulted in significant impacts on the State's water supplies. The Water Conservation Act of 2009 (SBx7-7) was signed into law by Governor Schwarzenegger which requires mandatory conservation up to 20% by 2020.

At the local level, water agencies have enacted their own ordinances to deal with the impacts of drought. In March 2009, the City adopted a new Water Conservation Ordinance (Ordinance 3717). This Ordinance establishes various water use restrictions, with the main focus on prohibitions of wasteful uses of water. The ordinance provides for four levels implementation including the baseline

permanent measures and three levels of inclining water use restrictions depending on the severity of a water supply shortage situation (Levels 1, 2 and 3). The Ordinance applies to the entire City.

5.3 REGIONAL SUPPLY RELIABILITY

As a result of continued challenges to its water supplies, MWD understands the importance of reliable water supplies. MWD strives to meet the water needs of Southern California by developing new projects to increase the capacity of its supplies while encouraging its member agencies to develop local supply project to meet the needs of its customers. Also, MWD is committed to developing and maintaining high-capacity storage reservoirs, such as Diamond Valley Lake (see **Figure 5.2** below), to meet the needs of the region during times of drought and emergency.

Figure 5.2: MWD's 800,000 AF Diamond Valley Lake

MWD operates Diamond Valley lake, an 800,000 AF reservoir, to avoid the repercussions of reduced supplies from the SWP and CRA. In addition, MWD operates several additional storage reservoirs in Riverside, San Bernardino, and San Diego Counties to store water obtained from the SWP and the CRA. Storage reservoirs like these are a key component of MWD's supply capability and are crucial to MWD's ability to meet projected demand without having to implement the Water Supply Allocation Plan (WSAP). This is crucial since the SWP and CRA have become more restricted which could render the City's supplies more vulnerable to shortage.

Colorado River Aqueduct Reliability

Water supply from the CRA continues to be a critical issue for Southern California as MWD competes with several agricultural

water agencies in California for unused water rights to the Colorado River. Although California's allocation has been established at 4.4 million acre-feet (MAF) per yer, MWD's allotment stands at 550,000 AFY with additional amounts which increase MWD's allotment to 842,000 AFY if there is any unused water from the agricultural agencies.

MWD recognizes that due to competition from other states and other agencies within California has decreased the CRA's supply reliability. In 2003, the Quantification Settlement Agreement (QSA) was signed which facilitated the transfer of water from agricultural agencies to urban uses.

State Water Project Reliability

The reliability of the SWP (**Figure 5.3**) impacts Metropolitan's member agencies' ability to plan for future growth and supply. DWR's Bulletin 132-07, December 2008, provides certain SWP reliability information, and in 2009, the DWR Bay-Delta Office prepared a report specifically addressing the reliability of the SWP. This report, The State Water Project Delivery Reliability Report, provides information on the reliability of the SWP to deliver water to its contractors assuming historical precipitation patterns.

On an annual basis, each of the 29 SWP contractors including Metropolitan requests an amount of SWP water based on their anticipated yearly demand. After receiving the requests, DWR assesses the amount of water supply available based on precipitation, snow pack on northern California watersheds, volume of water in storage, projected carry over storage, and Sacramento-San Joaquin Bay Delta regulatory requirements. For example, the SWP annual delivery of water to contractors has ranged from 552,600 AFY to 3.5 MAF. Due to the uncertainty in water supply, contractors are not typically guaranteed their full Table A Amount (a table indicating annual allocations to SWP contractors), but instead a percentage of that amount based on the available supply.

Each December, DWR provides the contractors with their first estimate of allocation for the following year. As conditions develop throughout the year, DWR revises the allocations.

Figure 5.3: State Water Project (SWP)

Due to the variability in supply for any given year, it is important to understand the reliability of the SWP to supply a specific amount of water each year to the contractors.

Current Reservoir Levels

Statewide, storage reservoir levels rise and fall due to seasonal climate changes which induce increase in demand. During periods of drought, reservoir levels can drop significantly and can limit the amount of supplies available. As a result, both DWR and MWD monitor their reservoir levels regularly. In 2009, conditions of several key reservoirs indicated drought conditions. Currently in 2011, reservoir levels are high as indicated by **Figures 5.4** and **5.5**:

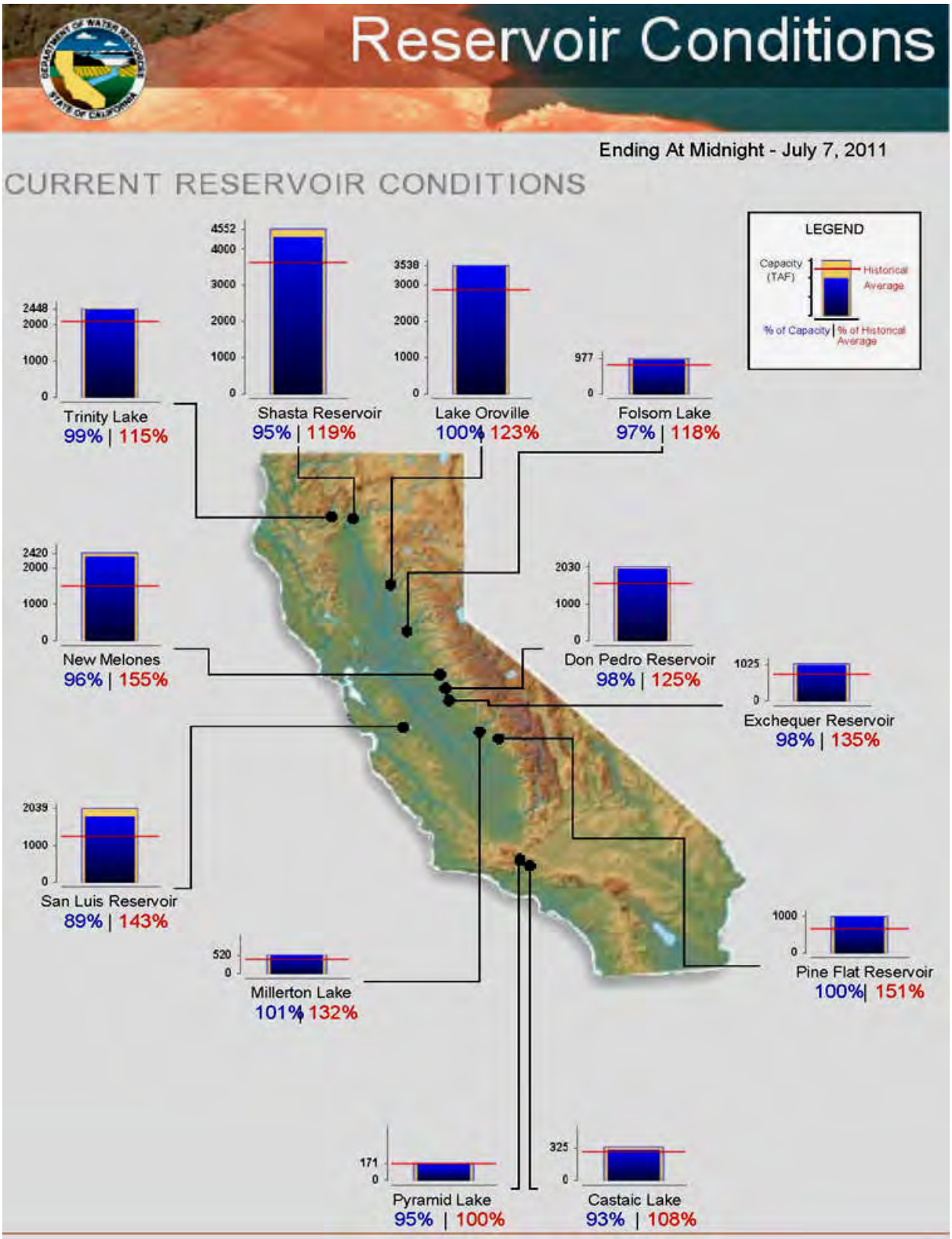

Figure 5.4: California State Reservoir Levels

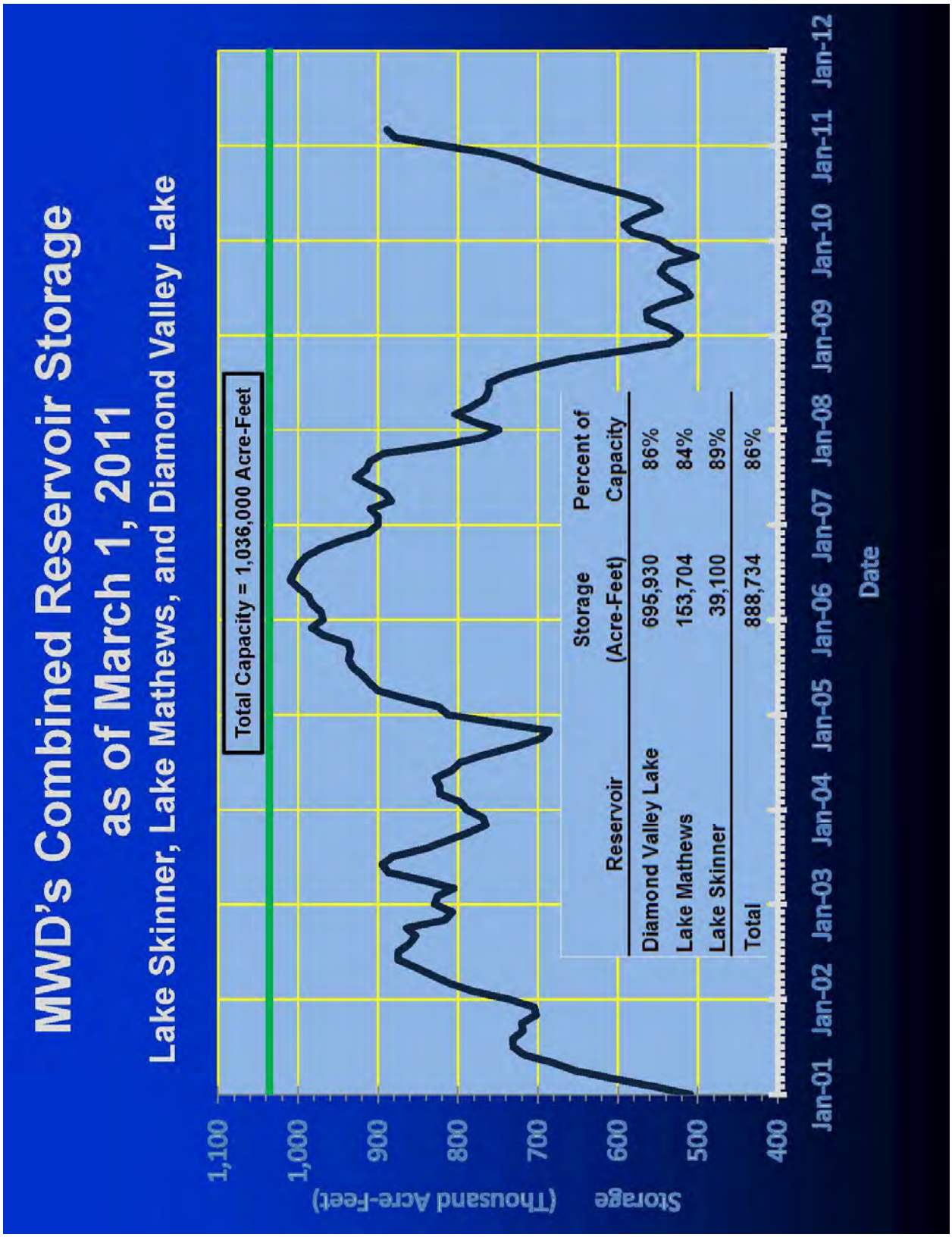

Figure 5.5: MWD Reservoir Levels

5.4 SUPPLY VS. DEMAND

As the City obtains its water sources from imported water, local groundwater, desalted groundwater, and recycled water, the City's water supply reliability is based on the capacity and vulnerability of its infrastructure in addition to the seasonal demand changes brought about by periods of drought. MWD's reliability of supply has direct impact on the City. Population growth will also continue to be a factor in future reliability projections. Since the City is pursuing 100% local water sustainability, having continued access to imported water increases the City's supply reliability.

Regional Supply Reliability

Southern California is expected to experience an increase in regional demands in the years 2015 through 2035 as a result of population growth. Although increases in demand are expected, they are limited due to the requirements of SBx7-7 which provides a cap on water consumption rates (i.e. per capita water use). It can be reasonably expected that the majority of agencies will be at or near their compliance targets by 2020 and thereafter as conservation measures are more effectively enforced. **Tables 2.9-2.11** of MWD's 2010 RUWMP (see Appendix G) show supply reliability projections for average and single dry years through the year 2035. The data in these tables is important to effectively project and analyze supply and demand over the next 25 years for many regional agencies. It is noteworthy that Projected Supplies During a Single Dry Year and Multiple Dry Years indicates MWD's projected supply will exceed its projected single dry year and multiple dry year demands in all years. Likewise, for average years, MWD supply exceeds projected demands for all years. The data contained in these tables has an indirect effect on the City's imported supply capacity and thus this data will also be used to develop the City's projected supply and demand over the next 25 years. **Tables 5.2** and **5.3** show MWD's supply reliability

City Supply Reliability

To project future supply and demand comparisons, it will be assumed that demand will increase minimally based on population growth of 0.5% per year and a constant water use of 172 GPCD (recent gross 3-yr average not accounting for SBx7-7 reductions -see Tables in Appendix E). **Table 5.1** contains the projected populations that will be used to project demand:

Table 5.1
Torrance Municipal Water
Service Area Population Projections

Year	Population
2010	103,111
2015	105,715
2020	108,384
2025	111,126
2030	113,927
2035	116,804

Demand = Population x GPCD Rate

Using available data for dry years 2002, 2003, and 2004, the increase in demand for a three year drought period was calculated as a percentage of a normal year. To project demands during drought periods, a single dry year increase of 108.0% will be used (based on past dry year increase in 2002) and multiple dry year increases of 108.0%, 102.0%, and 107% (based on past multiple dry year increases in 2002-2004).

Table 5.2
MWD Regional Imported Water Supply Reliability Projections
Average and Single Dry Years

Row	Region Wide Projections	2015	2020	2025	2030	2035
Supply Information						
A	Projected Supply During an Average Year[1]	3,485,000	3,810,000	4,089,000	3,947,000	3,814,000
B	Projected Supply During a Single Dry Year[1]	2,.457,000	2,782,000	2,977,000	2,823,000	2,690,000
C = B/A	Projected Supply During a Single Dry Year as a % of Average Supply	**70.5%**	**73.0%**	**72.8%**	**71.5%**	**70.5%**
Demand Information						
D	Projected Demand During an Average Year	2,006,000	1,933,000	1,985,000	2,049,000	2,106,000
E	Projected Demand During a Single Dry Year	2,171,000	2,162,000	2,201,000	2,254,000	2,319,000
F = E/D	Projected Demand During a Single Dry Year as a % of Average Demand	**108.2**	**111.8**	**110.9**	**110.0**	**110.1**
Surplus Information						
G = A-D	Projected Surplus During an Average Year	1,479,000	1,877,000	2,104,000	1,898,000	1,708,000
H = B-E	Projected Surplus During a Single Dry Year	286,000	620,000	776,000	569,000	371,000
Additional Supply Information						
I = A/D	Projected Supply During an Average Year as a % of Demand During an Average Year	**173.7**	**197.1**	**206.0**	**192.6**	**181.1**
J = A/E	Projected Supply During an Average Year as a % of Demand During Single Dry Year	**160.5**	**176.2**	**185.8**	**175.1**	**164.5**
K = B/E	Projected Supply During a Single Dry Year as a % of Single Dry Year Demand (including surplus)	**113.2**	**128.7**	**135.3**	**125.2**	**116.0**

Table 5.3
MWD Regional Imported Water Supply Reliability Projections
Average and Multiple Dry Years

Row	Region Wide Projections	2015	2020	2025	2030	2035
Supply Information						
A	Projected Supply During an Average Year[1]	3,485,000	3,810,000	4,089,000	3,947,000	3,814,000
B	Projected Supply During Multiple Dry Year Period*	2,248,000	2,417,000	2,520,000	2,459,000	2,415,000
C = B/A	Projected Supply During Multiple Dry Year as a % of Average Supply	**64.5%**	**63.4%**	**61.6%**	**62.3%**	**63.3%**
Demand Information						
D	Projected Demand During an Average Year	2,006,000	1,933,000	1,985,000	2,049,000	2,106,000
E	Projected Demand During Multiple Dry Year Period[2]	2,236,000	2,188,000	2,283,000	2,339,000	2,399,000
F = E/D	Projected Demand During Multiple Dry Year Period as a % of Average Demand	**111.5**	**113.2**	**115.0**	**114.2**	**113.9**
Surplus Information						
G = A-D	Projected Surplus During an Average Year	1,479,000	1,877,000	2,104,000	1,898,000	1,708,000
H = B-E	Projected Surplus During Multiple Dry Year Period	12,000	229,000	237,000	120,000	16,000
Additional Supply Information						
I = A/D	Projected Supply During an Average Year as a % of Demand During an Average Year	**173.7**	**197.1**	**206.0**	**192.6**	**181.1**
J = A/E	Projected Supply During an Average Year as a % of Demand During Multiple Dry Year	**155.9**	**174.1**	**179.1**	**168.7**	**159.0**
K = B/E	Projected Supply During a Multiple Dry Year as a % of Multiple Dry Year Demand (including surplus)	**100.5**	**110.5**	**110.4**	**105.1**	**100.7**

Table 5.4
Torrance Municipal Water Supply Availability & Demand Projections
Normal Water Year

Water Sources	2015	2020	2025	2030	2035
Available Supply (AF)					
Imported Water	20,967	20,967	20,967	20,967	20,967
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**29,007**	**29,007**	**29,007**	**29,007**	**29,007**
Recycled	6,500	6,650	7,150	7,150	7,150
Total Supply	**35,507**	**35,657**	**36,157**	**36,157**	**36,157**
% of Normal Year	100%	100%	100%	100%	100%
Demand (AF)					
Imported Water	12,328	12,842	13,369	13,910	14,464
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**20,368**	**20,882**	**21,409**	**21,950**	**22,504**
Recycled	100.0%	100.0%	100.0%	100.0%	100.0%
Total Demand	6,500	6,650	7,150	7,150	7,250
% of Normal Year	**26,868**	**27,532**	**28,559**	**29,100**	**29,754**
Supply/Demand Comparison					
Supply/ Demand Difference	8,639	8,125	7,598	7,057	6,403
Difference as % of Supply	24.33%	22.79%	21.01%	19.52%	17.71%
Difference as % of Demand	32.16%	29.51%	26.60%	24.25%	21.52%

Table is intended only to show City will be able to meet demand for all years per the following*:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on the TMW's Tier 1 limit of 20,967 AFY

3. Groundwater Supply/Demand based on TMW's anticipated use of adjudicated right of 5,640 AFY

4. Desalter Supply/Demand based on capacity of Goldsworthy facility (2.75 MGD) operating at about 75% capacity

5. Recycled Supply/Demand based on projections available from WBMWD & TMW

**TMW may pump amounts different from its adjudicated rights of 5,640 AFY based on expansion of Goldsworthy Desalter. Additionally, imported supplies may or may not be reduced. Demand of 172 GPCD is a conservative estimate based on SBx7-7 limits. Actual demand is likely to be below 133 GPCD with water efficiency trends in the City.*

Table 5.5
Torrance Municipal Water Supply Availability & Demand Projections
Single Dry Year

Water Sources	2015	2020	2025	2030	2035
Available Supply (AF)					
Imported Water	15,799	18,677	20,406	19,613	18,867
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**23,839**	**26,717**	**28,446**	**27,653**	**26,907**
Recycled	6,500	6,650	7,150	7,150	7,250
Total Supply	**30,339**	**33,367**	**35,596**	**34,803**	**34,157**
Normal Year Supply	85%	94%	98%	96%	94%
Demand (AF)					
Imported Water	13,957	14,512	15,082	15,666	16,264
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**21,997**	**22,552**	**23,122**	**23,706**	**24,304**
% of Normal Year	108.0%	108.0%	108.0%	108.0%	108.0%
Recycled	6,500	6,650	7,150	7,150	7,250
Total Demand	**28,497**	**29,202**	**30,272**	**30,856**	**31,554**
Supply/Demand Comparison					
Supply/Demand Difference	1,842	4,165	5,324	3,948	2,602
Difference as % of Supply	6.07%	12.48%	14.96%	11.34%	7.62%
Difference as % of Demand	6.46%	14.26%	17.59%	12.79%	8.25%

Table is intended only to show City will be able to meet demand for all years per the following:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections and a single dry-year increase of 108.0% of Normal Year Demand. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on imported demand multiplied by Table 5.2 Row K

3. All other Items derived in similitude to Table 5.4

Table 5.6
Torrance Municipal Water Supply Availability & Demand Projections
Multiple Dry Years (2011-2015)

Water Sources	2011	2012	2013	2014	2015
Available Supply (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	20,967	20,967	18,571	17,458	13,822
Desalter	1,500	1,800	1,800	1,800	2,400
Groundwater	1,500	1,500	1,500	1,500	5,640
Total Potable	**23,967**	**24,267**	**21,871**	**20,758**	**21,862**
Recycled	6,500	6,500	6,500	6,500	6,500
Total Supply	**30,467**	**30,767**	**28,371**	**27,258**	**28,362**
% of Normal Year	100%	100%	92%	89%	92%
Demand (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	16,965	16,765	18,479	17,371	13,753
Desalter	1,500	1,800	1,800	1,800	2,400
Groundwater	1,500	1,500	1,500	1,500	5,640
Total Potable	**19,965**	**20,065**	**21,779**	**20,671**	**21,793**
% of Normal Year	100.0%	100.0%	108.0%	102.0%	107.0%
Recycled	6,500	6,500	6,500	6,500	6,500
Total Demand	**26,465**	**26,565**	**28,279**	**27,171**	**28,293**
Supply / Demand Comparison					
	Normal Years		**Multiple Dry Years**		
Supply/Demand Difference	4,002	4,202	92	87	69
Difference as % of Supply	13.13%	13.66%	0.33%	0.32%	0.24%
Difference as % of Demand	15.12%	15.82%	0.33%	0.32%	0.24%

Table is intended only to show City will be able to meet demand for all years per the following:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections and multiple dry-year increases of 108.0%, 102.0%, and 107.0% of Normal Year Demand. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on imported demand multiplied by Table 5.2 Row K

3. All other Items derived in similitude to Table 5.4

Table 5.7
Torrance Municipal Water Supply Availability & Demand Projections
Multiple Dry Years (2016-2020)

Water Sources	2016	2017	2018	2019	2020
Available Supply (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	20,967	20,967	15,867	14,607	15,884
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**29,007**	**29,007**	**23,907**	**22,647**	**23,924**
Recycled	6,500	6,500	6,500	6,500	6,650
Total Supply	**35,507**	**35,507**	**30,407**	**29,147**	**30,574**
% of Normal Year	100%	100%	86%	82%	86%
Demand (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	12,429	12,532	14,288	13,153	14,303
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**20,469**	**20,572**	**22,328**	**21,193**	**22,343**
% of Normal Year	100.0%	100.0%	108.0%	102.0%	107.0%
Recycled	6,500	6,500	6,500	6,500	6,650
Total Demand	**26,969**	**27,072**	**28,828**	**27,693**	**28,993**
Supply/Demand Comparison					
	Normal Years		**Multiple Dry Years**		
Supply/Demand Difference	8,538	8,435	1,579	1,453	1,581
Difference as % of Supply	24.05%	23.76%	5.19%	4.99%	5.17%
Difference as % of Demand	31.66%	31.16%	5.48%	5.25%	5.45%

Table is intended only to show City will be able to meet demand for all years per the following:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections and multiple dry-year increases of 108.0%, 102.0%, and 107.0% of Normal Year Demand. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on imported demand multiplied by Table 5.2 Row K

3. All other Items derived in similitude to Table 5.4

Table 5.8
Torrance Municipal Water Supply Availability & Demand Projections
Multiple Dry Years (2021-2025)

Water Sources	2021	2022	2023	2024	2025
Available Supply (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	20,967	20,967	16,492	15,200	16,509
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**29,007**	**29,007**	**24,532**	**23,240**	**24,549**
Recycled	6,650	6,650	6,650	6,650	7,150
Total Supply	**35,657**	**35,657**	**31,182**	**29,890**	**31,699**
% of Normal Year	100%	100%	87%	84%	89%
Demand (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	12,946	13,051	14,852	13,689	14,868
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**20,986**	**21,091**	**22,892**	**21,729**	**22,908**
% of Normal Year	100.0%	100.0%	108.0%	102.0%	107.0%
Recycled	6,650	6,650	6,650	6,650	7,150
Total Demand	**27,636**	**27,741**	**29,542**	**28,379**	**30,058**
Supply/Demand Comparison					
	Normal Years		**Multiple Dry Years**		
Supply/Demand Difference	8,021	7,916	1,640	1,511	1,641
Difference as % of Supply	22.49%	22.20%	5.26%	5.06%	5.18%
Difference as % of Demand	29.02%	28.53%	5.55%	5.33%	5.46%

Table is intended only to show City will be able to meet demand for all years per the following:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections and multiple dry-year increases of 108.0%, 102.0%, and 107.0% of Normal Year Demand. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on imported demand multiplied by Table 5.2 Row K

3. All other Items derived in similitude to Table 5.4

Table 5.9
Torrance Municipal Water Supply Availability & Demand Projections
Multiple Dry Years (2026-2030)

Water Sources	2026	2027	2028	2029	2030
Available Supply (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	20,967	20,967	16,217	14,963	16,234
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**29,007**	**29,007**	**24,257**	**23,003**	**24,274**
Recycled	7,150	7,150	7,150	7,150	7,150
Total Supply	**36,157**	**36,157**	**31,407**	**30,153**	**31,424**
% of Normal Year	100%	100%	87%	83%	87%
Demand (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	13,476	13,584	15,430	14,237	15,446
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**21,516**	**21,624**	**23,470**	**22,277**	**23,486**
% of Normal Year	100.0%	100.0%	108.0%	102.0%	107.0%
Recycled	7,150	7,150	7,150	7,150	7,150
Total Demand	**28,666**	**28,774**	**30,620**	**29,427**	**30,636**
Supply/Demand Comparison					
	Normal Years		**Multiple Dry Years**		
Supply/Demand Difference	7,491	7,383	787	726	788
Difference as % of Supply	20.72%	20.42%	2.51%	2.41%	2.51%
Difference as % of Demand	26.13%	25.66%	2.57%	2.47%	2.57%

Table is intended only to show City will be able to meet demand for all years per the following:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections and multiple dry-year increases of 108.0%, 102.0%, and 107.0% of Normal Year Demand. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on imported demand multiplied by Table 5.2 Row K

3. All other Items derived in similitude to Table 5.4

Table 5.10
Torrance Municipal Water Supply Availability & Demand Projections
Multiple Dry Years (2031-2035)

Water Sources	2031	2032	2033	2034	2035
Available Supply (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	20,967	20,967	16,135	14,904	16,152
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**29,007**	**29,007**	**24,175**	**22,944**	**24,192**
Recycled	7,150	7,150	7,150	7,150	7,150
Total Supply	**36,157**	**36,157**	**31,325**	**30,094**	**31,342**
% of Normal Year	100%	100%	87%	83%	87%
Demand (AF)					
	Normal Years		**Multiple Dry Years**		
Imported Water	14,020	14,130	16,023	14,800	16,039
Desalter	2,400	2,400	2,400	2,400	2,400
Groundwater	5,640	5,640	5,640	5,640	5,640
Total Potable	**22,060**	**22,170**	**24,063**	**22,840**	**24,079**
% of Normal Year	100.0%	100.0%	108.0%	102.0%	107.0%
Recycled	7,150	7,150	7,150	7,150	7,150
Total Demand	**29,210**	**29,320**	**31,213**	**29,990**	**31,229**
Supply/Demand Comparison					
	Normal Years		**Multiple Dry Years**		
Supply/Demand Difference	6,947	6,837	112	104	112
Difference as % of Supply	19.21%	18.91%	0.36%	0.34%	0.36%
Difference as % of Demand	23.78%	23.32%	0.36%	0.35%	0.36%

Table is intended only to show City will be able to meet demand for all years per the following:

1. Total Demand based on 172 GPCD (FY 2008-2010 average) multiplied by population projections and multiple dry-year increases of 108.0%, 102.0%, and 107.0% of Normal Year Demand. See Table E-1 in Appendix E for breakdown of actual water consumption from FY 1996-2010.

2. Imported Water Supply Availability based on imported demand multiplied by Table 5.2 Row K

3. All other Items derived in similitude to Table 5.4

Based on the data contained in **Tables 5.4-5.10**, the City can expect to meet future demands through 2035 for all climatologic classifications. Projected groundwater supply capacities are not expected to be significantly affected during times of low rainfall and over short term dry periods of up to three years. However, during prolonged periods of drought, the City's imported water supply capacities may potentially be reduced significantly due to reductions in MWD's storage reservoirs resulting from increases in regional demand.

5.5 VULNERABILITY OF SUPPLY

Due to the semi-arid nature of the City's climate and as a result of past drought conditions, the City is vulnerable to water shortages due to its climatic environment and seasonally hot summer months. While the data shown in **Tables 5.4** through **5.10** identify water availability during single and multiple dry year scenarios, response to a future drought would follow the water use efficiency mandates of the City's Water Shortage Contingency Plan along with implementation of the appropriate stage of regional plans such as the WSDM Plan (MWD). These programs are discussed in Section 7.

5.6 WATER SUPPLY OPPORTUNITIES

City Projects

The City continually reviews practices that will provide its customers with adequate and reliable supplies. As discussed in **Section 2**, the City will maximize its groundwater supply capacity through the drilling of additional wells to achieve its adjudicated right of 5,640 AFY by 2015. In late 2008, TMW completed a focused Business Plan that addressed infrastructure and water supply reliability needs. As a result, the project to drill additional wells and ancillary facilities is currently in the planning stage and a preliminary engineering report has recently been completed. The proposed additional wells along with the new Well # 9 will provide sufficient capacity to pump the City's full annual groundwater pumping entitlement of 5,640 acre feet.

Regional Projects (MWD)

MWD is implementing water supply alternative strategies for the region and on behalf of member agencies to ensure available water in the future. Some of these strategies include:

- Enhanced Conservation
- Water recycling & groundwater recovery
- Storage/groundwater management programs within the region
- Storage programs related to the SWP and the Colorado River
- Other water supply management programs outside of the region

MWD has made investments in conservation and supply augmentation as part of its long-term water management strategy. MWD's approach to a long-term water management strategy was to develop an Integrated Resource Plan (IRP) to include many supply sources. A brief description of the various programs implemented by MWD to improve reliability is included **Table 5.11** below:

Table 5.11
MWD IRP 2010 Regional Resources Status

Supply	Description	
Colorado River Aqueduct (CRA)	Metropolitan holds a basic apportionment of Colorado River water and has priority for an additional amount depending on availability of surplus supplies. Water management programs supplement these apportionments.	
State Water Project (SWP)	Metropolitan receives water delivered under State Water Contract provisions, including Table A contract supplies, use of carryover storage in San Luis Reservoir, and Article 21 interruptible supplies.	
Conservation	Metropolitan and the member agencies sponsor numerous conservation programs in the region that involve research and development, incentives, and consumer behavior modification.	
	Code-Based Conservation	Water savings resulting from plumbing codes and other institutionalized water efficiency measures.
	Active Conservation	Water saved as a direct result of programs and practices directly funded by a water utility, e.g., measures outlined by the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMPs). Water savings from active conservation completed through 2008 will decline to zero as the lifetime of those devices is reached. This will be offset by an increase in water savings for those devices that are mandated by law, plumbing codes or other efficiency standards.
	Price Effect Conservation	Reductions in customer use attributable to changes in the real (inflation adjusted) cost of water.
Local Resources	*Groundwater*	Member-agency produced groundwater from the groundwater basins within the service area.
	Groundwater Recovery	Locally developed and operated, groundwater recovery projects treat contaminated groundwater to meet potable use standards. Metropolitan offers financial incentives to local and member agencies through its Local Resources Program for recycled water and groundwater recovery. Details of the local resources programs are provided in **Appendix A.6**.
	Los Angeles Aqueduct (LAA)	A major source of imported water is conveyed from the Owens Valley via the LAA by Los Angeles Department of Water and Power (LADWP). Although LADWP imports water from outside of Metropolitan's service area, Metropolitan classifies water provided by the LAA as a local resource because it is developed and controlled by a local agency.
	Recycling	Recycled water projects recycle wastewater for M&I use.
	Surface Water	Surface water used by member agencies comes from stream diversions and rainwater captured in reservoirs.
Groundwater Conjunctive Use Storage Programs	Metropolitan sponsors various groundwater storage programs, including, cyclic storage programs, long-term replenishment storage programs, and contractual conjunctive use programs. Details of the groundwater storage programs are provided in **Appendix A.4**.	
Surface Water Storage	Metropolitan reservoirs (Diamond Valley Lake, Lake Mathews, Lake Skinner) and flexible storage in California Department of Water Resources (DWR) reservoirs (Castaic Lake, Lake Perris). Details of the surface storage reservoirs are provided in **Appendix A.5**.	
Central Valley Storage & Transfers	Central Valley storage programs consist of partnerships with Central Valley water districts to allow Metropolitan to store SWP supplies in wetter years for return in drier years. Metropolitan's Central Valley transfer programs consist of partnerships with Central Valley Project and SWP settlement contractors to allow Metropolitan to purchase water in drier years. Details of the Central Valley Storage and Transfer programs are provided in **Appendix A.3**.	

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SECTION 6: CONSERVATION MEASURES

6.1 INTRODUCTION

As a result of diminished existing supplies and difficulty in developing new supplies, water conservation is important to Southern California's sustainability. Therefore, TMW acknowledges that efficient water use is the foundation of its current and future water planning and operations policies.

To conserve California's water resources, several public water agencies, and other interested parties of the California Urban Water Conservation Council (CUWCC) drafted the Memorandum of Understanding Regarding Urban Water Conservation (MOU) in 1991. The MOU establishes 14 Best Management Practices (BMPs) which are defined roughly as policies, programs, practices, rules, regulations, or ordinances that result in the more efficient use or conservation of water.

The 14 BMPs coincide with the 14 Demand Management Measures (DMMs) defined in the UWMP Act. The BMPs are intended to reduce long-term urban demands from what they would have been without their implementation and are in addition to programs which may be instituted during occasional water supply shortages.

6.2 CUWCC MEMBERSHIP

In 1993 TMW became a signatory of the CUWCC by signing the MOU and has expedited implementation of water conservation measures. TMW actively implements all 14 of the measures with good faith effort by achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in each BMP's definition as described in the MOU. Water conservation is an integral part of TMW's water policies.

Figure 6.1: Water Waste is Prohibited by City Code

6.3 CONSERVATION MEASURES

As signatory to the MOU, TMW has committed to use good-faith efforts to implement the 14 Demand Management Measures. In addition, TMW has continued to work with MWD to increase the effectiveness of its DMM programs and educate children on the importance of water conservation. In addition, TMW has been partnering with both the West Basin Municipal Water District (WBMWD) and the South Bay Environmental Center (SBEC) for the last four years to implement and promote a number of conservation programs, primarily targeted to the commercial, industrial and institutional sectors.

Overall, TMW's conservation efforts has led to efficient water use. These measurements have been updated to include the most recent data and implementation schedule for the DMM's. TMW's 14 DMM's are summarized in **Table 6.1** on the following page:

Table 6.1
Summary of Demand Management Measures
(CUWCC Best Management Practices)

Demand Management Measure		Description
DMM No. 1: Water Survey Programs for Single and Multi-Family Residential Customers		TMW's water surveys are aimed at developing residential customer water use efficiency for both landscape and indoor water use.
DMM No. 2: Residential Plumbing Retrofit		TMW's residential plumbing retrofit programs involve providing customers with free water efficient plumbing devices including , low-flow showerheads, interior conservation kits and faucet aerators .
DMM No. 3: System Water Audits, Leak Detection, and Repair		Conducted by water operations/maintenance staff, these programs aim at reducing water losses through a water agency's mains. Unaccounted for water in the TMW system is less than 5%
DMM No. 4: Metering With Commodity Rates		TMW meters all water users, Providing water meters and charging for service is a key component to TMW's water conservation policies. Nearly 90% of water rate revenues are derived from the commodity rate component, In addition, TMW converted to a conservation based rate structure in early 2011.
DMM No. 5: Large Landscape Conservation Programs and Incentives		Smart timers and drip irrigation systems are among the devices used in TMW to achieve landscape water use efficiency. TMW offers rebates for smart landscape controllers and water efficient spray heads
DMM No. 6: High-Efficiency Washing Machine Rebate Programs		Through this program, TMW's customers can receive a rebate towards the purchase of a high-efficiency washing machine.
DMM No. 7: Public Information Programs		These programs provide the public information to promote water conservation and water conservation-related benefits. TMW participates in a number of community outreach programs and events promoting water conservation and actively promotes conservation.

Table 6.1 (cont.)
Summary of Demand Management Measures
(CUWCC Best Management Practices)

Demand Management Measure		Description
DMM No. 8: School Education Programs		TMW partners with MWD to provide children an opportunity learn the importance of water conservation. In addition, TMW has periodically sponsored other educational programs to local schools.
DMM No. 9: Conservation Programs for Comm./Indust./Institutional (CII) Accounts		Through this program, TMW assists water using establishments in upgrading their plumbing devices. TMW has a number of CII programs directed toward specific CII sectors
DMM No. 10: Wholesale Agency Programs		Through this program, MWD provides TMW with resources to advance water conservation efforts and effectiveness
DMM No. 11: Conservation Pricing		The TMW rate structure is primarily commodity based with nearly 90% of revenues derived from water sales to encourage conservation .In, addition, the TMW rate structure was converted to conservation based tiered structure in early 2011.
DMM No. 12: Water Conservation Coordinator		Through this program, TMW has a staff member who is assigned conservation coordinator responsibilities and oversees TMW's water conservation measures.
DMM No. 13: Water Waste Prohibition		TMW has ordinances in place which prohibit the waste of water and penalizes wasteful water use. TMW implemented an updated Conservation Ordinance in 2009 that has permanent water use restrictions
DMM No. 14: Residential Ultra Low Flush Toilet Replacement Program		Through this program, TMW assists customers in replacing their existing toilets with water efficient models., and maintained a rebate program for water efficient toilets.

6.4 OVERVIEW OF TMW's DMMs

TMW has continued to work with MWD toward implementing the 14 cost-effective DMMs. The following presents the most current DMM implementation efforts:

DMM No. 1: Residential Surveys

Residential surveys have been conducted in TMW's service area on an informal basis by customer request generally through a high water bill complaint or meter reading that indicated higher than normal usage. When such a request is made, staff review past billing records for the account in question and compare them with the current bill. They then visit the customer's residence and review the information with them. A copy of the historical water usage pattern (usually two years) is provided to the customer. If it appears that a significant recent increase has occurred, staff first looks for signs of a possible leak. They also question the customer about possible internal plumbing problems (leaking faucets, running toilets, etc) and make recommendations to reduce landscape irrigation where appropriate. All residential meters are equipped with a leak detector feature to indicate leakage in the system when all fixtures are closed. Meter accuracy tests are provided upon request to verify that recorded consumption is correct. In addition, indoor conservation kits, low flow showerheads, faucet aerators and literature is provided to customers to inform them of current rebates on low water using fixtures and proper water use management.

In addition to the surveys performed in response to customer requests, TMW will be developing and distributing a self guided water audit guide to all customers in 2012. This water audit guide will provide customer with and easy to follow techniques to permit them to do a complete water audit will provide a complete water use audit of their interior and exterior water use, including leak detection, interior plumbing fixtures, water using appliances and exterior water use.

Figure 6.1: Residential Water Survey

TMW also participates in MWD's California Friendly program(formerly Protector del Agua), including landscape instructional classes to the residential and commercial sector. Beginning in 2010 TMW, in partnership with WBMWD, has been sponsoring a new landscape class and related "hands on" workshops, know as the "Ocean Friendly " program. A portion of the classes focuses on residential landscape audits. Future Protector del Agua classes will provide additional emphasis on how customers can identify, quantify and control their outdoor water use. Based on the California Urban Water Conservation Council's savings rates, set forth in the BMP Costs & Savings Study (December 2003), savings from untargeted intensive home surveys results in an average of 21 gpd per household (both single family and multi-family) total savings for future projections. **Tables 6.2** and **6.3** show the total historic and projected number of residential surveys and total water savings.

DMM No. 2: Residential Plumbing Retrofit

TMW maintains an active program for the distribution of conservation kits consisting of showerhead flow restrictors, toilet tank displacement devices, dye tablets for use in detecting toilet leaks, low flow faucet aerorators and brochures on conservation measures. The kits are distributed at no charge to residents in TMW's service area. The kits are provided at the City billing office, special public events, and educational presentations. Since 1977, TMW has distributed over 50,000—of the water conservation kits.

Figure 6.2: Low-Flow Showerhead

Since 1991, TMW has distributed low flow showerheads to single and multi-family customers, free of charge. Approximately 30,000 low flow showerheads have been distributed to residents throughout the City. Beginning in 2003, TMW began a new distribution program for ultra low flow showerheads. These showerheads are also free of charge, and are available through the City's Utility Billing Office, special events, and public presentations. As of 2006, the City makes updated interior water conservation kits, including water efficient faucet aerators, available to all residents throughout the City's service area.

In addition, developers are required to use low-water-use plumbing fixtures and appliances and highly encouraged to install drought resistant/low-water use landscapes. The use of recycled water for irrigation and industrial uses for those developments located by existing recycled water mains is also required providing it is feasible.

Residential Plumbing retrofits result in 5.2-5.8 gallons per day (gpd) water saved for showerheads and 8 gpd with a leak (or 0.64 gpd overall) for leak detection tablets. At this rate, an estimate of water savings can be calculated using historical and projected unit amounts. The data for this program is shown in **Tables 6.4** and **6.5**.

DMM No. 3: Leak Detection & Repair

The City aggressively repairs main breaks, hydrant leaks or breaks, and meter leaks, usually within hours of the occurrence. A team of water service workers are available to permanently repair main or hydrant breaks, and promptly restore water service. Both proactive and "inform and response" approaches are utilized for water meter leaks. Meter leaks are investigated and repaired promptly. The prompt fixing of leaks on private property is one of the requirements of the City's updated 2009 Water Conservation Ordinance.

TMW has initiated a water main capital improvement program (CIP) to replace deteriorated water mains. Since 1993, TMW has replaced approximately 50 miles of distribution system water mains. The CIP replaces 3 to 5 miles of water mains on an annual basis. As a result, the incidence of main breaks has declined by over 70 percent; from 180 breaks in the early 1990's to approximately 50 breaks at present. The long term goal is to reduce main breaks to less than 30 within the next 10 years.

TMW replaces large water meters at a rate

of approximately 30 to 40 per year. Large meters are systematically tested, calibrated and repaired to maintain optimal accuracy. Approximately 85 percent of TMW's water supply is delivered by gravity flow from MWD transfer connections. Therefore, the system uses relief and regulating valves, which are regularly inspected and refurbished, to avoid over-pressurization of the system. In addition, the City maintains its 7,500 valves in the water system at least once every two to three years.

Unaccounted-for water and water use is regularly monitored by the City. The City's goal was to reduce unaccounted-for water below the current average of approximately 5 percent by 2009. The audit process will focus on accounting for and minimizing "water losses" from various sources, including water production meters, system flushing, water main breaks, unmetered temporary water, wastewater uses, fire fighting, fire training exercises, and inaccurate end use metering. The program will be an ongoing activity incorporated into the water utility's work processes. Unaccounted water for the last several years has been below 5%.

In addition, the City is beginning to convert its metering to a full scale automatic meter reading (AMR) system. Based on the success of the current pilot program, the City will convert all 26,500 metered services on a phased basis to full AMR systems, which will improve meter reading accuracy. This full scale program will also involve the systematic changeout of approximately one half of the City's existing meters, which will improve accuracy and accountability of potable water supplies. To date approximately 5,000 meters have been converted to AMR with a planned capital improvement program to convert the remainder of the meter over the next five years.

The City has performed pilot leak detection programs in the past for its distribution system. Based on the results of these surveys, the City will determine if an ongoing leak detection program is cost effective.

Figure 6.3: Leak Detection

Additionally, the City implemented a Supervisory Control and Data Acquisition (SCADA) system beginning in 2002, which enables City staff to monitor and control the operation of system facilities at each location to maximize operational efficiency and performance. SCADA provides for faster response time to current malfunctions. This SCADA system has been upgraded several times over the last decade to incorporate additional facilities and to enhance the capabilities of the system

Tables 6.6 and **6.7** provides the City's current and projected water audit, leak detection and repair levels through 2010.

DMM No. 4: Metering With Commodity Rates

The City has universal metering for water accounts in its service area. Customer usage is recorded on water meters and it has been determined that approximately 90 percent of

water charges is related to the commodity rate. There are no unmetered service connections in the Municipal service area and construction meters are issued for the temporary use of Municipal water supplies.

In addition, all new construction with significant landscape irrigation demands is required to install a dedicated landscape meter. Beyond the meter retrofit program, landscape meters are installed in City parks and other facilities where current meters provide dual domestic and irrigation service. As the City replaces existing dual service meters, where feasible, these service connections will converted to dedicated domestic and irrigation meters during systematic meter replacement cycle where it is a feasible option.

Figure 6.4: Water Meter

TMW has a general policy to change out the meters every 15 years. Metering allows TMW to conserve a total of 20 to 30 percent of the water demand overall, and up to 40 percent savings during peak demand periods, as estimated by the CUWCC's BMP Costs and Savings Study (December 2003). **Table 4.2** in Section 4 shows the number of water service customers by sector between 2006 and 2010, and projected water use through 2030. The number of service connections is anticipated to increase only slightly through 2030, consistent with the projected small increase in population. All service connections are metered.

DMM No. 5: Large Landscape Programs

In FY 2004/05, the City supplied 7,045 AFY of recycled water for industrial and landscape irrigation purposes. This amount equals nearly 24 percent of the City's total water demands, saving an equal amount in potable water supplies. In the future, the recycled water system for landscape irrigation will be expanded over the next approximately 15 years and will supply 500 to 600 AFY of recycled water to City parks and other greenbelt areas. The ultimate build-out goal of the recycled water system will supply nearly 50 percent of landscape water requirements in the City by 2020. Recycled water is projected to consistently satisfy approximately ~~20~~ 25 percent of the City's total water demand through 2030.

Upon request, the City will also provide large landscape water audits. Notably, Torrance has secured a $20,000 grant from MWD's City Makeover Grant program in the category of Small Parks and Gardens. The City's Community Services Department and Parks and Recreation Commission was recently awarded funding for the "Showcase of Native Gardens at Madrona Marsh Project." The project was completed in 2006 transformed a grass landscape adjacent to the Madrona Marsh Nature Center into a demonstration native plant landscape, using locally native plants that have been present in the area since the 1800s. The project educates visitors about the historic relationships to visitors by providing environmental education, such as development and installation of interpretive panels, design and distribution of color brochures on water wise landscape irrigation, and docent training for conducting tours. This project was designed

to provide resource materials to both commercial and residential customers.

The adjacent Madrona Marsh Nature Center receives approximately 20,000 visitors annually. In addition to the Demonstration Garden , The Center has botanical native plant garden. The botanical garden and demonstration landscape garden receive over 15,000 visitors annually.

The demonstration landscape garden educates a large number of visitors throughout the City and the surrounding region. The project will also shows how irrigation water use may be reduced by up to 80 percent compared to water demand of current turf grass lawns. The demonstration landscape provides a variety of drought tolerant native California plants, intended to provide an impetus to encourage both commercial and residential customers to consider the advantages of installing water efficient landscapes.

Figure 6.5: Water Meter

The City's Green Team recently recommended that several public areas in the City be converted to water efficient landscape, primarily featuring native plants. Grant funding for this effort will be sought from MWD, USBR, and DWR and other potential sources. Project implementation is contingent upon such additional sources of funding.

The City participates in MWD's regional irrigation efficiency programs. MWD provides sponsorship and performance-based funding for these programs to offset the cost to the customer. The California Friendly (formerly Protector Del Agua) Water Efficient program is offered at a nominal cost. In addition, the companion Professional Program has been recently redesigned and offers information for the landscape professional on water management, state of the art irrigation systems, enhanced landscape practices, and practical ideas to improve their bottom line. The Program allows landscapers to stay abreast of the policy and activities of the water agencies, and proper cultural practices within their industry.

The City is in the process of implementing a water efficient irrigation controller retrofit program for irrigation and other water efficient fixture replacements throughout various City parks and street medians. This program, called the Water Efficient Evapotranspiration (ETo) Controller Program, is sponsored by MWD and will involve the change out of antiquated controllers in many of the largest Parks and Streetscape areas in the City with water efficient units that are remotely monitored and controlled from a central location to maximize irrigation efficiency. A portion of this program in the Parks is in the process of being implemented through funding secured under the recent Federal stimulus grants to cities. Full scale implementation is dependent on additional funding.

DMM No. 6: HE Washing Machines

The City is implementing a rebate program for the installation of approved high efficiency washing machines (HEWM) for City residents. The program implemented in

2008. Projected participation is projected at approximately 200 rebates per year through 2015.The program will be jointly promoted with the City's existing conservation rebate and distribution programs.

Figure 6.6: HE Washing Machines

The water savings can be estimated at an average of 85 to 109 gallons per week per machine, with 14.4 to 28.7 gpd/machine for single family residences. Based on CUWCC estimates, the mean savings of 5,085.6 gallons per year may be applied to each HECW. **Table 6.8** shows estimated water savings based on this rate of savings.

DMM No. 7: Public Information Programs

The City disburses a variety of water conservation brochures and pamphlets at the Civic Center Complex, public libraries, the Torrance Billing Office, other public building and to the public upon request. Bill inserts providing tips for conserving water are also periodically included in the mail to educate the residents.

The City also provides speakers to local community groups, service clubs, and schools upon request regarding water conservation and water related topics. During specific times at the Civic Center and the City's public libraries, exhibits are displayed which portray water conservation and supply management activities. Cable Television Programs are another way the City promotes water conservation by showing water related films and PSA announcements. In the event one cannot get to a television, the Torrance Library has a substantial inventory of water conservation and water related videos that can be checked out. In 2005, the City Library initiated a water resource program to acquire and disseminate publications and videos on water related topics. The City has sponsored several public information programs in conjunction with the Torrance Library regarding water including "Is the South West Running Dry" in 2009. Newspapers and magazines such as the Daily Breeze, Easy Reader, and the City's Recreation Reporter also supply information about water conservation.

Furthermore, the City continues to promote water conservation by active relationship with the public. For one, the City actively participates in City and Civic events such as City Yard Day, City Health Fair, and Chamber of Commerce Expo, Earth Day events, sponsored by local businesses and community groups , a City Environmental Fair, Library sponsored events and other community fairs and expos. Secondly, the City, in coordination with MWD, provides tours of the Colorado River project (CRA), the State Water Project (SWP), and the Diamond Valley Lake. In addition, the City and other City staff attend water conferences and seminars to stay informed about water conservation and supply management programs. Further, the City periodically provides presentations on water subjects to various civic and homeowner groups.

MWD's California Friendly Landscape program offers classes in landscape design, maintenance and irrigation systems to professionals and residents. The residential

program was offered at least once a year, and a total of 30 class sessions were held from 2005 through 2009. Beginning in 2010, TMW in partnership with West Basin Municipal Water District, implemented a new landscape workshop program known as the Ocean Friendly Program. The program s implemented with the services of landscape firm specializing in native landscapes design and educational outreach. The program consists of traditional workshop sessions and is augumented by "hands on " site workshops and "work days" at actual sites that are being transformed into California Friendly landscapes. To date, 3 workshops sessions have been held and one hands on site workshop and one workday have held. It is planned that TMW will sponsor at least four traditional workshops and two hands on workshops/workdays per year through 2015. In addition, a program for the professional landscape industry is in the planning stage and is expected to be launched in 2012.

Through MWD's External Affairs Group, conservation-related activities are offered to the public, including residents of the City's service area. The programs include the Speaker's Bureau, which provides speakers for organizations, service clubs, churches, and businesses and other community groups and associations. An estimated 15,000 to 20,000 people attend the presentations annually.

The Community Relations program organizes and conducts an average of 80 Board Director-sponsored inspection trips for MWD's distribution system annually for elected officials, community leaders and members of the public. Approximately 3,000 people learn about MWD's conservation and water management policies and practices each year through these trips. The education curriculum and program activities engage an average of 150,000 students per year. MWD's Media and Publications group conducts editorial briefings and media field trips, assembles press packet; prepares and disseminates news releases, speeches, videos, fact sheets, brochure, articles and editorials describing water management objectives and programs. The government relations sector provides elected officials, public agencies, businesses and organizations with information about MWD's water management objectives and programs.

Tables 6.10 and **6.11** summarize the City's public information program activity as described above.

DMM No. 8: School Education Programs

Through MWD, water education programs are available to the City's elementary through high schools. Programs are either supplemental or curriculum-based which include classroom presentation, audio-visual programs, hands-on activities, take-home materials for students, and workbooks. The following provides a summary of the programs offered: Admiral Splash for Grade 4 (started in 1983), All About Water for grades K-3 (started in 1991), Geography of Water for grades 4-8 (started in 1993), Water Politics for grades 9-12 (started in 1994), Water Ways for grade 5 (started in 1995), Water Quality for grades 7-12 (started in 2001), Water Works for grades 7-12 (started in 2001), and Water Times for grade 6 (started in 2005).

In 2001, a multi-faceted program called Living Wise was presented to the Torrance Unified School District by the City and two other City departments. The program meets state education framework requirements and concentrates on water education, water resource management and conservation,

along with energy and other resource conservation in other sectors. A pilot program for Living Wise was initiated in partnership with the Southern California Edison (SCE) Company in the Spring 2005. The program covered approximately 4,000 middle school students from 2005 through 2008 in the Torrance schools.

Figure 6.7: West Basin's School Programs

If the State Public Utilities Commission approves SCE's new funding request, the City plans to partner with SCE to provide this program to Torrance schools on an on-going basis. **Tables 6.12** and **6.13** show the estimated number of students participating in the school education program in the City's service area.

DMM No. 9: Commercial, Industrial, Institutional Programs

The City actively participates in the Commercial, Industrial and Institutional (CII) Program, which MWD is sponsoring along with its member agencies. The program primarily contains financial rebates to achieve water efficiency for commercial and industrial customers and the City participates in all MWD CII programs, including the following:

- Cooling Tower Conductivity Controller (CTCC) Rebate Program – A $625 installation rebate is offered to commercial and industrial customers who install conductivity controllers that would save 800,000 gallons of water per year.

- Commercial High Efficiency Toilets (HET) & Zero Water Urinals (ZWU) Rebate Program – A $60 rebate is offered for each zero water urinal and $50 for each high efficiency toilet.

- Water Broom Rebate Program – A $110 rebate will be provided to commercial and industrial customers who purchase a water-pressurized broom and replace old hose nozzles.

- Dry Vacuum Pump Rebate Program - A $125 rebate is offered for dental, medical, manufacturing facilities and other businesses that purchase a dry vacuum pump.

- Weather Basin Irrigation Controller (WBIC) and Central Computer Irrigation Controller (CCIC) Rebate Program – Rebates incentives vary by agency. These weather-based "smart" controllers are available to avoid over-watering and excessive run-off by scheduling the amount of irrigation based on the type of landscape and current weather conditions

The City has established a partnership with the West Basin Municipal Water District in 2006 for the implementation of various conservation programs. Most of these programs have been targeted to the CII sector and the programs have included the following:

- Complete Restroom Retrofit program for small business and

institutional customers
- A Large Landscape Audit program
- A High Efficiency Toilet (HET) Retrofit Program for the hospitality Industry
- An Industrial Audit and fixture retrofit program
- A food service educational, training and fixture replacement program known as "Cash for Kitchens"
- An energy/water retrofit program for Multifamily complexes known as the "Green Living " program
- An HET retrofit program for office buildings and institutional customers
- A HET and water-efficient retrofit program for City buildings

In addition, several new programs are in the planning stage and/or in process for receipt grant funding .

The City also has an extensive recycled water program, in which the City currently meets approximately 22 percent of its total water demand from recycled supplies. Industrial customers such as the ExxoMobil Oil Refinery and Toyota Motor Corporation actively utilize the recycled water program and over 96 percent of recycled supplies are for industrial application. Recycled water is projected to consistently supply up to 25 percent of the City's demand through 2035.

The City launched an information campaign called, "Get Green" to its business sector on water recycling and conservation of resources. The first brochure was mailed to all businesses in the City in late spring of 2005. A portion of the multi-part brochure is devoted to business sector water conservation awareness, and focuses on the CII program and MWD's Industrial Process program. The Industrial Process Improvement Program offers financial assistance to local industries to encourage investment in water-saving process improvements. The Program is open to all public and private commercial and industrial users within MWD's service area. Financial assistance is provided for documented water savings derived from projects implemented under the program that meet the minimum qualifying criteria.

Figure 6.8: Zero-Water Urinals

A series of water and energy conservation workshops was held in the City of Torrance in 2007 – 2009 for various CII sectors including: the hotel/motel industry, the restaurant and catering industry, office buildings, and hospital and medical buildings. These workshops were jointly sponsored by the City, the WBMWD, SCE, the Southern Gas Company and the South Bay Environmental Center. Several additional sessions are in the planning stage.

DMM No. 10: Wholesale Agency Programs

As the City's wholesale agency, MWD actively provides assistance through implementation of conservation programs within the City's service area, as well as guidance for the City staff in implementation of a variety of conservation programs, as described throughout this section. MWD provides selective funding for water surveys, residential retrofits, system audits, landscape programs, HEWM

rebate, public information and outreach, CII programs, and the assistance of multiple Conservation Coordinators.

DMM No. 11: Conservation Pricing and Billing Procedures

The first goal of any rate structure is to generate sufficient revenues to maintain efficient and reliable utility operations, and the second is fairness in the allocation of utility service costs. Generally, it is possible to satisfy both of these goals in a rate structure that encourages water conservation or penalizes excessive water use. Designing water rates must include the following: 1) determination of the water utility's total annual revenue requirements for the period for which the rates are to be in effect, 2) determination of service costs by allocation of the total revenue requirements to the basic water system cost components and distribution of these costs to the various customer classes in accordance with service requirements, and 3) design water rates to recover the cost of service from each class of customer.

The City's former Rate Structure provided customers with a uniform commodity rate. Every quantity of water used by the customer is charged at the same commodity rate except for discounts provided to low income Torrance seniors and disabled customers. In early 2011, the City converted to a conservation inkling tiered rates structure, which contains four tiers for single family customers and two tier for all other standard customers . This transition was implemented to provide a pricing incentive to promote ongoing conservation. And appropriate water resource management.

The City also maintains water use records and water bills on a continuous basis for approximately 26,500 customer accounts for five years. These documents supply current and previous customer consumption data, necessary information to monitor customer usage and various conservation efforts.

DMM No. 12: Conservation Coordinator

The City has assigned a Senior Administrative Analyst Conservation Coordinator responsibilities to implement conservation programs within its service area. The Conservation Coordinator also works collaboratively with cities and water agencies within the region, including MWD, WBMWD, WRD, and the South Bay Environmental Center to enhance conservation effort.

DMM No. 13: Water Waste Prohibition

The City Council of Torrance passed Ordinance No. 3717 in 2009 which replaced and updated an earlier ordinance (Ordinance No. 3320) which established certain water use restrictions and water waste prohibitions on a permanent basis.

Figure 6.9: Water Waste is prohibited in the City

The ordinance is arranged into four stages in which City Council declares a specific stage (known as Permanent Baseline Requirements and Levels 1, 2, and 3) to enact during a water supply shortage or an emergency. During each stage all water customers within the City are to abide to conservation

requirements as approved by the City Council. The permanent conservation stage is the baseline level, which is effect at all times, regardless of the water supply situation. Details of this program are described in Section 7 of this plan and in Appendix G.

DMM No. 14: Ultra-Low-Flush and High Efficiency (HET) Toilet Replacement Program

The ULFT program involves the use of an ULFT toilet which uses 1.6 gallons of water per flush or less as opposed to old toilets that use at least 5 gallons per flush. In 1992, the City's Plumbing code requires that all new construction sites must have ULFT toilets to reduce water. In order to promote the installation of ULFT's, the City, along with MWD, currently sponsored both ULFT residential and commercial/industrial rebate programs. A $50 rebate was offered to all residents of the City who replace their old toilets with 1.6 gallon or less ULFTs. Beginning in 2008 program eligibility was restricted to HET toilets using 1.28 gallons or less per flush.

Due to saturation levels and market transformation, the residential HET rebate program was terminated in 2010. The program results in annual water saving of at least 1,500 gallons per ULFT or HET. In addition, the City previously sponsored a ULFT distribution program in the 1990's that replaced nearly 4,000 old water consuming toilets with ULFT's.

The CII HET rebate program is still in effect. Utilizing this program along with other grant funds and municipal funding, the City, in partnership with West Basin Municipal Water District, provided turn key retrofits over 2,000 HET's for commercial, institutional and multi-family customers within the City of Torrance over the past four years .

The City is planning to retrofit bathrooms in most of its public building with HETs and low flush urinals in mid 2011. This will result in the replacement of approximately 300 older toilets with high efficiency HETs.

Figure 6.10: Ultra-Low-Flush Toilet

Tables 6.14 and **6.15** provide historic and projected number of residential ULFT and HET rebates within the City's service area and the associated expenditures and water savings through 2010.

Additional Conservation

In addition to the previously mentioned conservation measures the City implements conservation policies and programs which result in the efficient use of water.

6.6 DMM IMPLEMENTATION

The City monitors the status of its DMM programs, which include a qualitative status of some of the DMMs (i.e. low-flow showerhead distribution), and a qualitative status of others. The results of the City's programs over recent years is analyzed to measure the effectiveness of the programs. Data for the City's DMMs is provided in **Tables 6.2-6.16** on the following pages.

DMM No. 1: Residential Water Survey Programs

Table 6.2
Recent Water Survey Programs

	2005	2006	2007	2008	2009	2010
No. of Surveys	464	344	485	416	525	500
Water Savings (AFY)	11	9	11	10	12	12

Table 6.3
Projected Water Survey Programs

	2011	2012	2013	2014	2015
No. of Surveys	400	425	400	450	450
Water Savings (AFY)	10	11	12	12	12

DMM No. 2: Residential Plumbing Retrofit

Table 6.4
Recent Residential Plumbing Retrofits

	2005	2006	2007	2008	2009	2010
# of Single Family devices	100	1,500	1,500	1,500	1,500	1,500
# of Multifamily devices	100	200	200	300	400	400
Expenditures	$1,000	$9,500	$9,500	$9,000	$9,500	$9,500
Water Savings (AFY)	6	5	5	5	6	6

Table 6.5
Projected Residential Plumbing Retrofits

	2011	2012	2013	2014	2015
# of Single Family devices	1,500	1,500	1,500	1,500	1,500
# of Multifamily devices	500	500	500	500	500
Expenditures	$10,000	$10,000	$10,000	$10,000	$10,000
Water Savings (AFY)	6	6	6	6	6

DMM No. 3: System Water Audits, Leak Detection, & Repair

Table 6.6
Recent Water Audits, Leak Detection, & Repair

	2005	2006	2007	2008	2009	2010
% of Unaccounted **	6%	7%	5%	4%	3%	3%
Distribution Lines Replaced	2	3	4	1	1	1
Expenditures	$2 mil	$3 mil	$4 mil	$1 mil	$1 mil	$1 mil

Table 6.7
Projected Water Audits, Leak Detection, & Repair

	2011	2012	2013	2014	2015
% of Unaccounted Water	5%	5%	5%	5%	5%
Distribution Lines Replaced (mi)	1	3	4	4	4
Expenditures	$1 million	$3 million	$4 million	$4 million	$4 million

DMM No 6: HE Washing Machine Rebate Programs

Table 6.8
Recent HE Washing Machine Rebates

	2005	2006	2007	2008	2009	2010
$ per rebate	$85	$85	$85	$85	$85	$85
# of HEWM rebates	---	---	---	---	179	124
Expenditures	---	---	---	---	$18,000	$18,000
Water Savings (AFY)	---	---	---	----	9	6.2

Note: HEWM rebates began in 2009

Table 6.9
Projected HE Washing Machine Rebates

	2011	2012	2013	2014	2015
$ per rebate	$85	$85	$85	$85	$85
# of HEWM rebates	400	400	400	400	400
Expenditures	$34,000	$34,000	$34,000	$34,000	$34,000
Water Savings (AFY)	20	20	20	20	20

DMM No. 7: Public Information Programs

Table 6.10
Recent Public Information Programs

Program	2006	2007	2008	2009	2010
Paid Advertising	X	X	X	X	X
Public Service Announcements	X	X	X	X	X
Bill inserts / Newsletters / Brochures	X	X	X	X	X
Bill showing water usage in comparison to previous year's usage	X	X	X	X	X
Demonstration Gardens	X	X	X	X	X
Special Events, Media Events	X	X	X	X	X
Speaker's Bureau	X	X	X	X	X
Program to coordinate with other government agencies, industry and public interest groups and media	X	X	X	X	X
Ocean Friendly Landscape Workshops	X	X	X	X	X
Expenditures	$15,000	$15,000	$15,000	$15,000	$15,000

Table 6.11
Projected Public Information Programs

Program	2011	2012	2013	2014	2015
Paid Advertising	X	X	X	X	X
Public Service Announcement	X	X	X	X	X
Bill inserts / Newsletters / Brochures	X	X	X	X	X
Bill showing water usage in comparison to previous year's usage	X	X	X	X	X
Demonstration Gardens	X	X	X	X	X
Special Events, Media Events	X	X	X	X	X
Speaker's Bureau	X	X	X	X	X
Program to coordinate with other government agencies, industry and public interest groups and media	X	X	X	X	X
Ocean Friendly Landscape Workshops	X	X	X	X	X
Expenditures	$15,000	$20,000	$20,000	$20,000	$20,000

DMM No. 8: School Education Programs

Table 6.13
Projected School Education Programs

Grades	Number of Students				
	2011	2012	2013	2014	2015
4th-6th	200	500	2,000	2,000	2,000
Expenditures	$2,000	$10,000	$20,000	$20,000	$20,000

DMM No. 14: Ultra-Low-Flush Toilet (ULFT) and High Efficiency Toilet (HET) Replacement Program

Table 6.14
Recent ULFT and HET Replacements

THE CITY	2006	2007	2008	2009	2010
# of ULFT Rebates (Total Single & Multi-Family)	257	252	211	93	80
Expenditures	---	---	$16,800	$14,300	$11,000
Actual Water Savings (AFY)	---	---	10	9	6

Table 6.15
Projected ULFT and HET Replacements

THE CITY	2011	2012	2013	2014	2015
# of ULFT Rebates – Single Family	TBD	TBD	TBD	TBD	TBD
# of ULFT Rebates – Multi-Family	400	400	400	400	400
Expenditures – Single Family	TBD	TBD	TBD	TBD	TBD
Expenditures – Multi- Family	$20,000	$20,000	$20,000	$20,000	$20,000
Actual Water Savings (AFY)	12	12	12	12	12

NOTE: HET rebate program ended in 2010. Plan to replace with HET distribution event program to begin in 2013

Methods to Evaluate DMM Effectiveness

Table 6.16
DMM Implementation Schedule and Methods to Evaluate Effectiveness

DMM Program	Implementation Schedule	Methods to Evaluate Effectiveness
DMM No. 1 Residential Surveys		
Pilot Survey	01/12 to 07/12	Degree of customer acceptance/participation. Potential savings per survey.
Water Use Audit Guide Development and distribution of guide	07/12 to 12/12	Degree of customer participation. Potential water savings in the TMW service area.
Ocean Friendly Residential Water Efficient Classes & Hands-On Workshops	Ongoing 4 to 6 sessions per year	Attendance/community interest. Participation in hands-on Workshops
DMM No. 2 Residential Plumbing Retrofits		
ULF Showerhead	Ongoing since 1991	Approximately 1,500 distributed annually, depending on degree of customer demand. Water savings in the TMW's service area. Customer requests.
Interior Conservation Kit distribution program and faucet aerators	Ongoing since 2006	Distribution based on customer acceptance and demand. Potential water savings per customer. Customer requests.
DMM No. 3 Distribution System Audits, Leak Detection and Repair		
Informal water audits	Ongoing since 2006	Reduction in unaccounted-for water losses. Informal accounting for all major uses of water.
Automatic Meter Reading (AMR) Metering	Initiated in 2005 Phase Program Through 2015	Reductions in meter inaccuracies and unaccounted-for water. Success in detection of leaks.
DMM No. 4 Metering with Commodity Rates		
---	Fully metered system, including temporary services	All usage recorded by meter reading. Unaccounted For water at 5% or less.

DMM Program	Implementation Schedule	Methods to Evaluate Effectiveness
DMM No. 5 Large Landscape Conservation Program		
Use recycled water for greenbelt irrigation	Initiated in 1995 Planned recycled water system expansion on a phased basis through 2035	Decrease in imported water demand. Recycled water at 25% of total supply by 2035.
Madrona Marsh Nature Center Water Efficient Demonstration Landscape Project	Completed 2006	Requests for brochures/information packets and tours of landscape. Level of customer acceptance. Number of tours
Development of Resources materials for large landscape customers	Completion 2012	Number of requests for information packets.
Eco-friendly water efficient Landscaping Classes for landscape professionals	One training series annually beginning in 2011	Attendance/acceptance by landscape professionals and municipal landscape personnel.
Retrofit of Water Efficient Landscape Controllers in City Parks/Medians/Steetscape Areas	Initiate pilot program 2012; implement first phase in 2013	Water reduction at each location. Degree of acceptance by Parks personnel. Quantifiable water savings.
Educational West High School Full Scale Demonstration and Resource Landscape Project	Initiate Phase 1 2011 Completion 2013	Participation by students and comments in project development. Visitation of site. Request for resource materials.
DMM No. 6 Large Landscape Conservation Program		
---	Implement first half in 2006	Degree of participation. Quantifiable water savings.
DMM No. 7 Public Information Programs		
Participate in a minimum of four community events per year.	Ongoing	---
Annual inspection tours of Colorado River facilities and bi-annual tours of State Water Project facilities.	Ongoing	---
Speakers Bureau to local community groups	Ongoing	---
Water efficient landscape classes. Hands on workshops	Ongoing	Attendance and Participation
Newspaper articles/conservation ads	Ongoing	---
Local City cable programs on water conservation/ resources	Ongoing	---

DMM Program	Implementation Schedule	Methods to Evaluate Effectiveness
Special Water Programs Sponsored in Conjunction with City Library	Periodic Every 1-2 Years	Attendance At Event
DMM No. 8 School Education Programs		
Living Wise in-school education program	Pilot program initiated in Spring 2005; partner with SCE beginning Spring 2006	Degree of participation. Satisfaction survey of teachers.
MWD sponsored in- school educational programs	Ongoing	Degree of participation. Satisfaction survey from teachers.
DMM No. 9 Commercial, Industrial, and Institutional Programs		
Standard CII (MWD & TMW Sponsored)	Ongoing	Extent of participation. Water savings.
MWD Industrial Process Improvement Programs	Full scale program initiated in 2006	Extent of participation. Projected Water Savings.
DMM No. 10 Wholesale Agency Programs		
N//A	N//A	N//A
DMM No. 11 Conservation Pricing		
---	Established conservation based. Tiered Rate structure in March 2011	Water savings. Degree of customer acceptance.
DMM No. 12 Conservation Coordinator		
---	Ongoing - Staff Member Assigned responsibility	Response from community members on coordinator assistance. Extent of Participation in Conservation Programs
DMM No. 13 Water Waste Prohibition		
---	New Ordinance enacted in 2009	Reduction in water use. Compliance with water waste restrictions
DMM No. 14 ULFT and HET Toilet Replacement		
Rebate program	Ongoing since 2003. Residential Rebate Program suspended in 7/10 due to Funding. CII rebate & CII & residential retrofit programs ongoing.	Quantifiable water savings. Continued customer demand. Saturation Level

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SECTION 7: CONTINGENCY PLANNING

7.1 INTRODUCTION

Water supplies may be interrupted or reduced significantly in a number of ways including droughts, earthquakes, and power outages which hinder a water agencies ability to effectively deliver water. Drought impact increase with the length of a drought, as carry-over supplies in reservoirs are depleted (see **Figure 7.1** on Page 7-3) and water levels in groundwater basins decline. The ability to manage water supplies in times of drought or other emergencies is an important part of water resources management for a community.

As the City receives imported water from MWD and extracts groundwater from the West Coast Basin, the City's response to an emergency will be a coordinated effort of its own staff in conjunction with other local and regional water agencies. During water shortage emergencies, the City will implement its Water Supply Shortage Response Plan which imposes greater than a 30 percent reduction in the total water supply.

7.2 RESPONSE PLAN

In 1991, the Torrance City Council adopted an Emergency Water Conservation Program, under Ordinance 3320, which established four stages of water shortage severity based on predicted or actual water supply reductions. In March 2009 the City adopted an updated Water Conservation Ordinance (Ordinance 3717). The City implements certain initiatives to optimize water supply during water shortages or drought conditions. In the event of a water shortage, City Council will implement the appropriate water conservation stage by resolution.

The objectives of the response plan are to:

1. Prioritize essential uses of available water
2. Avoid irretrievable loss of natural resources
3. Manage current water supplies to meet ongoing and future needs
4. Maximize local municipal water supplies
5. Eliminate water waste city-wide
6. Create equitable demand reduction targets
7. Minimize adverse financial effects

The following priorities for use of available water are listed in order from highest to lowest priority:

1. Health and Safety including: consumption and sanitation for all water users; fire suppression; hospitals, emergency care, nursing and other convalescent homes and other similar health care facilities; shelters and water treatment
2. Institutions, including government facilities and schools such as public safety facilities, essential government operations, public pools and recreation areas
3. All non-essential commercial and residential water uses
4. Landscaped areas, including parks, cemeteries, open spaces, government-facility landscaped areas and green belt areas
5. New water demand

Stages of Action

The City has a legal responsibility to provide for the health and safety water needs of the community. The City will manage water supplies to minimize the social and economic impacts of water shortages. The Water Supply Shortage Response Plan is designed to provide a minimum of 70 percent of normal supply (30 percent reduction in supply) during a severe or extended water shortage. The City's two potable water sources are local groundwater (including desalted water) and imported MWD deliveries. Rationing stages may be triggered by a shortage in one source or a combination of sources, and shortages may trigger a stage at any time. **Table 7.1** shows the stages of action the City will take in the case of an emergency water shortage, as declared by the Water Shortage Response Plan and supported by City Ordinance 3717.

Table 7.1
Ordinance 3717 Water Conservation and Water Supply Shortages

Shortage Level	Restriction Type	Total Water Supply Reduction Percentage
Baseline	Mandatory	In effect at all times
Level 1	Mandatory	Up to 15%
Level 2	Mandatory	15%-30%
Level 3	Mandatory	More than 30%

During water shortages, the City Council may declare by resolution that a Level 1, Level 2, or Level 3, water shortage stage exists and that the actions outlined in Ordinance 3717 are necessary. The type of event which may prompt the City Council to declare a water supply shortage may be a result of MWD declaring a need for extraordinary water conservation. Water Supply Shortages may be caused by: a drought; a state or local emergency; a natural disaster that critically impacts the water treatment or water distribution system; a localized event that critically impacts the water supply; water quality; water treatment or water distribution system; the City's wholesale water agency (MWD) requests extraordinary water conservation efforts in order to avoid mandatory water allocations; and when MWD implements a mandatory water allocation program.

Metropolitan Water District WSDM Plan

In addition to the provisions of the City's Water Shortage Response Plan, the City will also work in conjunction with MWD to implement conservation measures within the framework of MWD's Water Surplus and Drought Management (WSDM) Plan. The WSDM Plan was developed in 1999 by MWD with assistance and input with its member agencies. The plan addresses both surplus and shortage contingencies.

The WSDM Plan guiding principle is to

minimize adverse impacts of water shortage and ensure regional reliability. The plan guides the operations of water resources (local resources, Colorado River, SWP, and regional storage) to ensure regional reliability. It identifies the expected sequence of resource management actions MWD will take during surpluses and shortages of water to minimize the probability of severe shortages that require curtailment of full-service demands. Mandatory allocations are avoided to the extent practicable, however, in the event of an extreme shortage an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

Figure 7.1: Severe Droughts Highlight the Importance of Conservation Ordinances

7.3 THREE-YEAR MINIMUM SUPPLY

MWD modeling, as discussed above, results in 100 percent reliability for full-service demands through the year 2035. MWD's 2010 Regional UWMP demonstrates their demand/supply balance in multiple dry years, single dry years, and average years in **Tables 5.2** and **5.3** in Section 5. Under the worst-case supply scenario, MWD would curtail deliveries of potable water to the City by about 30 percent for three years consecutively. During this time period, the City's local water supply sources are expected to remain at or near normal levels as groundwater in the West Coast Basin is expected to be drought-proof for short term drought periods of 3 years (due to artificial recharge in the basin). The City can expect the ability to extract its adjudicated right of

5,640 AFY from its wells while extracting an additional 2,400 AFY from its Goldsworthy Desalter over a drought period of up to three years. Recycled water will continue to be fully available to meet water demands. Thus, the City can expect to meet its water needs over a three year dry period based on the supplies listed below in **Table 7.2**:

Table 7.2
Projected 3-yr Minimum Water Supply (AF)

Source	2011	2012	2013
Imported	18,571	17,458	13,822
Desalter	1,500	1,800	1,800
Ground	1,500	1,500	1,500
Recycled	6,500	6,500	6,500
Total	**28,071**	**27,258**	**23,622**

7.4 CASTROPHIC INTERRUPTIONS

A water shortage emergency could be a catastrophic event such as result of drought, failures of transmission facilities, a regional power outage, earthquake, flooding, supply contamination from chemical spills, or other adverse conditions.

The City's Emergency Response Plan includes a Water Distribution Sample Action Plan to be followed in the case of a water shortage emergency. The initial effort includes a safety/damage assessment, where the extent of damage to each department will be determined. Primary consideration at the department level will be given to what is the status of its personnel and the facilities that it needs for its operations. This includes any facility critical to the department's operations whether or not it is a City facility. Each department will then identify which facilities will be available and which faculties need to be inspected by a building inspector. The Department Safety/Damage Assessment team will do a walk through or may drive to assigned areas. The information gathered will be provided to the Planning Section of the Department Operation Center and then the City Emergency Operations Center (EOC) Planning Section. The water facilities classified as Critical Facilities in the Emergency Operations Plan will be initially inspected by TMW and other personnel as needed.

During a disaster, the City will also work cooperatively with Metropolitan through their Member Agency Response System (MARS) to facilitate the flow of information and requests for mutual-aid within Metropolitan's 5,100-square mile service area. Metropolitan's Palos Verdes reservoir and the three imported transmission mains are in close proximity to the City of Torrance, and, therefore, the possibility of Metropolitan being entirely unable to deliver water to the City is unlikely. The City's Water Master Plan contains analysis showing that the City's T-8 connection provides sufficient excess capacity to offset the shutdown of one of the three Metropolitan pipelines serving the City. By adjusting the inflow from the connections still in service, the loss of one pipeline could adequately be offset. However, should the Palos Verdes Feeder be out of service connections T-1 and T-8 can be adjusted to compensate. In the event of groundwater supply loss, all supply could be imported from Metropolitan, and it is confirmed that the necessary capacity is available to do so.

Additional emergency services in the State of California include the Master Mutual Aid Agreement, California Water Agencies Response Network (WARN) and Plan

Bulldozer. The Master Mutual Aid Agreement includes all public agencies that have signed the agreement and is planned out of the California Office of Emergency Services. WARN includes all public agencies that have signed the agreement to WARN and provides mutual aid assistance. It is managed by a State Steering Committee. Plan Bulldozer provides mutual aid for construction equipment to any public agency for the initial time of disaster when danger to life and property exists.

7.5 PROHIBITIONS

In accordance with the City's updated Water Conservation Ordinance 3717 enacted in March of 2009, the City has prescribed a number of water use restrictions which are continuously and permanently enforced as part of the City's Municipal Code. Additional water use restrictions are mandated where the severity of restrictions are based on severity of the water shortage.

Mandatory Prohibitions

The City of Torrance's three phase approach to implementing water conservation and prohibiting wasteful use during a water shortage includes, but is not limited to, the following:

Permanent Baseline Requirements

- Landscape irrigation is prohibited between the hours of 10 a.m. & 4 p.m.
- No washing down hard or paved surfaces
- No excessive water flow or runoff from any lawn or landscaped surface.
- Restaurants serve drinking water upon request only.

Level 1

- Notification to water users of water shortage status and that a 15% reduction of water use is required.
- Landscape irrigation is prohibited between the hours of 9 a.m. and 5 p.m.
- Duration of landscape watering is limited to 15 minutes per day.
- Sequence of landscape watering cycle is limited to 3 days per week.
- All water leaks in water user's plumbing or distribution system must be repaired within 7 days of notification by the City.

Level 2

- Notification to water users of water shortage status and that a 15% to 30% reduction of water use is required.
- Landscape irrigation is prohibited between the hours of 8 a.m. and 6 p.m.
- Duration of landscape watering is limited to 10 minutes per day.
- Sequence of landscape watering cycle is limited to 2 days per week.
- All water leaks in water user's plumbing or distribution system must be repaired within 4 days of notification by the City.

Level 3

- Notification to water users of water shortage status and that a minimum 30% reduction of water use is required.
- Landscape irrigation is prohibited with some exceptions based on critical facilities related to public health, safety, and essential City

operations.
- All water leaks in water user's plumbing or distribution system must be repaired within 2 days of notification by the City.
- The City reserves the right to discontinue water service to customers who willfully violate provisions of level 3 restrictions.

Additional water conservation provisions are set forth in City Ordinance 3717 such as the use of rain sensors and evapo-transpiration sensors for large landscape areas, requirement of reticulating water systems for commercial car washes, building permit stipulations, and recycled water feasibility study for all new development. The City's specific prohibitions on water use can be found in the City's Municipal Code (Appendix G).

Penalties or Charges

Violation of the regulations and restrictions on water use in accordance with Ordinance 3717 may result in penalties punishable by a fee and a possible jail sentence. According to Ordinance 1317, any person who violates any provision of the water conservation ordinance is guilty of a misdemeanor punishable by imprisonment in the county jail for not more than 30 days, or by a fine not exceeding $1,000, or by both fine and imprisonment.

- **First Violation:**
  City will deliver written notice of violation via mail.

- **Second Violation**
  City will deliver written notice of violation via mail.

- **Third Violation:**
  If the third violation is within a 12 month period then the City shall add a penalty to the next billing period water bill in the sum of $100.

- **Fourth Violation:**
  If the fourth violation is within a 12 month period then the City shall add a penalty to the next billing period water bill in the sum of $250.

- **Fifth and subsequent Violations:**
  The City shall add a penalty to the next billing period water bill in the sum of $500. In addition, the City shall install a flow restriction device restricting flow to one gallon per minute for water services for not less than 48 hours. In addition to any fines and the installation of a water flow restrictor, the City has the option to disconnect and/or terminate a customer's water service.

7.6 FISCAL IMPACTS

As water consumption decreases, the revenue generated through water sales also decreases. To continue operation, the City must generate sufficient revenue when faced with decreasing water sales revenue. Based on the City's total water revenue and operating expenses, demand reductions will result in negative net cash provided by operating activities. As a result, rate increases may be imposed.

Other than rate increases, other measures to overcome impacts of reduced water supply and consequential revenue shortfall will include the following:

1. Reduce the current fiscal year operation and maintenance expenses.
2. Defer Capital Improvement

Projects

3. Reduce future projected operation and maintenance expenses.
4. Increase the fixed readiness-to-serve charge to establish a substantial firm revenue base.
5. Increase commodity charge and water adjustment rate to cover revenue requirements.

TMW has recently implemented a 5 Year Rate Plan to adjust rates starting in calendar 2011 through calendar 2015. Any changes in Municipal rates are now subject o modified Proposition 218 Notification Protest Ballot and Public Hearing Process. Any adjustment from the approved 5 Year plan would need to implemented in accordance with Proposition 218 requirements.

A combination of the measures outlined above may be used to offset or diminish the effects of lost revenues. Capital construction projects may be deferred, as appropriate. The base water rate could be increased to cover the general operation, maintenance, system upgrades, and capital expenditures. An increase in the base rate would be temporarily employed and then return to pre-shortage rates when conditions improve. The measures will be subject to Proposition 218 requirements.

7.7 COUNCIL ORDINANCE

In March of 2009, the City Council adopted Ordinance No. 3717, which implemented a new Article 4 to Chapter 6 of Division 7 of the Torrance Municipal Code. The Ordinance addresses water conservation, establishes a water conservation program, and the stages for declaring water shortage emergency conditions. The Ordinance establishes a phased approach to water conservation and enforcement, and consists of three conservation levels or phases in increasing order of severity. The water conservation levels and related water use restrictions are described above. The specific language of Ordinance No. 3717 may be viewed in Appendix G.

Additionally, during an extended water shortage, the City Council will adopt by resolution the water shortage implementation stage. A Draft Resolution to implement the Water Conservation Program Stage of Action is included in Appendix H.

7.8 MECHANISMS TO DETERMINE ACTUAL REDUCTIONS IN WATER USE

The City will continue to use multiple measures to determine actual water consumption reductions, as follows:

- Normalized/averaged water use baseline
- More frequent review of production
- More frequent meter reading at customer locations
- More frequent leak detection and repair
- More frequent meter checking and repair
- System water audit
- Automated sensors and telemetry
- Monitor utility actions that impact usage
- Penalties for customers with excessive water use

Leak detection is enhanced at customer's premises through an Automated Meter Reading system that is presently being implemented on a phased basis.

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SECTION 8: WATER RECYCLING

8.1 INTRODUCTION

The Southern California region, from Ventura to San Diego, discharges over 1 billion gallons of treated wastewater to the ocean each day. This is considered a reliable and drought-proof water source and could greatly reduce the region's reliance on imported water. As technological improvements continue to reduce treatment costs, and as public perception and acceptance continue to improve, many reuse opportunities should develop. Recycled water is a critical part of the California water picture because of the area's high likelihood of drought. As treatment technology continues to improve, demand for recycled water will also increase.

8.2 RECYCLED WATER OVERVIEW

Recycled water is defined as domestic wastewater purified through primary, secondary and tertiary treatment. Recycled water is acceptable for most non-potable water purposes such as irrigation (**Figure 8.1**) and commercial/industrial processes. As part of its overall water resources planning, TMW investigated the feasibility and cost-effectiveness of incorporating recycled water into its water supplies and authorized the preparation of a Recycled Water Master Plan in 1992. An update of that plan was completed in 2005. The Recycled Water Master Plan Update identifies and prioritizes public and private sites for possible connection to the recycled water system. The update includes areas outside of TMW's service area but within the City limits.

The West Basin Municipal Water District (WBMWD) Recycled Water Master Plan was updated in 2009. The Plan was prepared in conjunction with various water purveyors and cities within WBMWD's service area, including LACSD, and WRD. TMW worked closely with WBMWD during its Recycled Water Master Plan Update as well with Department of Health Services (DHS), Torrance Unified School District, and the City's Park and Recreation and Streetscape Maintenance Divisions.

Figure 8.1: Recycled Water Irrigation

TMW has been able to use recycled water due to the implementation of the WBMWD's Water Reuse Program. This program is an aggressive effort to recycle up to 70,000 AFY of effluent from Los Angeles' Hyperion Wastewater Treatment Plant (**Figure 8.3** on Page 8-6). WBMWD's Edward C. Little Water Recycling Facility (ELWRF) provides up to 57 mgd (about 64,000 AFY) of recycled water to customers throughout WBMWD's service area. The ELWRF currently scheduled for a Phase V expansion to extend the capacity to 63.3 mgd (70,000 AFY).

TMW began purchasing recycled water from WBMWD in 1995, with ExxonMobil as its first customer, and has increased use each year until a maximum of nearly 7,500 AFY was used in FY 2002/2003. TMW also

recognizes the regional benefits of projects being implemented by the WRD and WBMWD to use recycled water to protect the Basin through groundwater recharge and seawater intrusion barrier projects.

Wastewater Collection & Treatment

The City's wastewater collection system consists of approximately 340 miles of pipeline ranging from 6 inches to 27 inches in diameter. Wastewater generated within the City is conveyed to the Joint Water Pollution Control Plant (JWPCP) in Carson, via LACSD interceptor sewers. The maximum design flow of the JWPCP is 385 MGD and the maximum design peak flow is 540 MGD. Treated wastewater from the JWPCP is disposed into an outfall in the Pacific Ocean located two miles offshore from White Point on the Palos Verdes Peninsula. The depth of the discharge point is approximately 200 feet below sea level. The JWPCP has an advanced primary treatment with 60 percent secondary treatment.

Municipal wastewater is generated in TMW's service area from a combination of residential, commercial, and industrial sources. The quantities of wastewater generated are generally proportional to the population and the water used in the service area. It is estimated that TMW customers generate wastewater based on 80 percent of potable water demand. **Table 8.1** displays the current and projected wastewater generated in the City through 2035. Because the wastewater treated at the JWPCP is discharged to the ocean, none of the wastewater generated within the City is treated to recycled water standards.

Table 8.1
Current and Projected Wastewater Collection

	2010	2015	2020	2025	2030	2035
Potable Water Demand	18,758	20,368	20,882	21,409	21,950	22,504
Collected Wastewater	15,006	16,294	16,706	17,127	17,560	18,003

Note: Wastewater collected is assumed to equal 80% of the potable water demand.

Recycled Water Infrastructure

Recycled water supply from the ELWRF is provided to various municipal and industrial customers via the distribution system shown in **Figure 8.2**. The ELWRF provides additional treatment to secondary-treated wastewater from the City of Los Angeles' Hyperion Wastewater Treatment Plant. The secondary-treated wastewater receives further treatment to meet Title 22 requirements. Through its three other facilities that receive recycled water from the ELWRF, WBMWD produces five different qualities of recycled water including: 1) Disinfected Tertiary Water, 2) Nitrified Water, 3) Softened Reverse Osmosis Water, 4) Pure Reverse Osmosis, and 5) Ultra-Pure Reverse Osmosis Water. WBMWD distributes recycled water to customer sites in its service area, including the City of Torrance and the City of Los Angeles. WBMWD recycles approximately 15 percent of the effluent from Hyperion. The remaining secondary treated wastewater is discharged to the ocean.

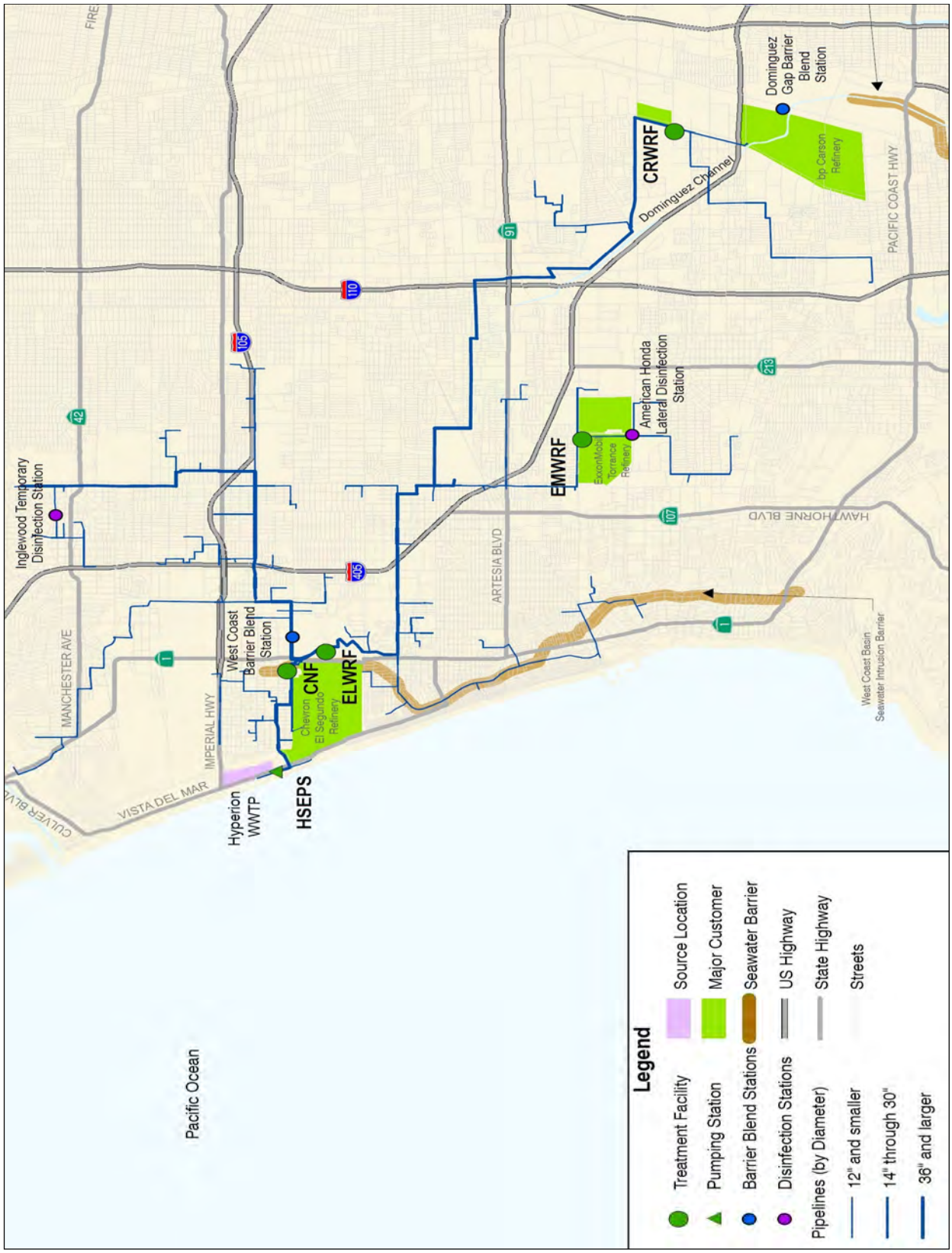

Figure 8.2: WBMWD's Current Recycled Water System

8.3 RECYCLED WATER PLANNING

Since 1995, TMW has been purchasing recycled water from WBMWD at a number of connections and serving it for non-portable purposes, mainly industrial and irrigation. In 1995, WBMWD opened a state-of-the-art water recycling facility in El Segundo (ELWRF), one of the largest recycling plants of its kind in the nation. All recycled water is produced at the ELWRF and distributed to either end-use sites or one of several satellite facilities where further treatment prepares the recycled water for large industrial customers such as Chevron, ExxonMobil, and BP Amco. ExxonMobil Refinery in the City is the largest recycled water user in the WBMWD recycled water service area. The refinery uses approximately 96 percent of all the recycled water used within the City. In March 2003, Toyota Motor Sales, USA, Inc. began using recycled water at its new "South Campus" facility. In 2007, the America Honda Motor Company began using recycled water for its irrigation system. Other recycled water sites located in the City include McMaster, Descanso, Guenser, and Colombia Parks and Casimir, Arlington, and Magruder Schools. **Table 8.2** below shows the current recycled water users in the City:

Table 8.2
Current Recycled Water Users in Torrance Municipal Water Service Area

Current User	Irrigation Demand (AFY)	Industrial Demand (AFY)	Annual Demand (AFY)
American Honda Motor Co.	27	---	**27**
Arlington Elementary	7	---	**7**
Casimir Middle School	8	---	**8**
Columbia Park	82	---	**82**
Descanso Park	5	---	**5**
ExxonMobil Refinery	---	6,173	**6,173**
Guenser Park	34	---	**34**
Kobata Growers	7	---	**7**
Magruder Middle School	8	---	**8**
McMaster Park	6	---	**6**
Landscape Medians	8	---	**8**
Toyota Motor Sales	19	73	**92**
Total	**211**	**6,246**	**6,457**

A preliminary assessment of potential recycled water uses within TMW service area was conducted in 1993 which identified the relative size and location of the recycled water market in the service area. The assessment was updated to include the entire City in 2005. The users recommended for connection to the recycled water distribution system are included in **Table 8.3**. Some of these users have been connected as a result of the Madrona Lateral/Palos Verdes Extension Phase I project which was completed in 2007. The next phase of the recycled projection in Torrance Municipal Water service area is scheduled for 2012. The next phase includes South High School, Calle Mayor Middle School, along with medians along Anza Avenue. **Table 8.4** summarizes the current and projected annual recycled water demand for the City for industrial and landscape irrigation users.

Table 8.3
Projected Recycled Water Users in Torrance Municipal Water Service Area

Projected Users	Irrigation Demand (AFY)	Industrial Demand (AFY)	Annual Demand (AFY)
Anza Medians	1.5	---	**1.5**
Calle Mayor Middle School	4	---	**4**
Caltrans 405/Artesia	8	---	**8**
Dow Chemical	1	12	**13**
Lincoln Elementary	6	---	**6**
La Poloma Park	1	---	**1**
Madrona Middle School	7	---	**7**
New Horizons Golf Course	15	---	**15**
Seaside Heroes Park	10	---	**10**
South High School	26	---	**26**
Torrance & Sherry Elementary	15	---	**15**
Wilson Park	32	---	**32**
Total	**126.5**	**12**	**138.5**

Table 8.4
Current, Projected, and Potential Recycled Water Use by Type

Recycled Water Use Type	2010	2015	2020	2025	2030	2035
Industrial	6,245	6,300	6,300	6,300	6,300	6,300
Landscape Irrigation	211	350	350	850	850	850
Total	**6,456**	**6,650**	**6,650**	**7,150**	**7,150**	**7,150**

8.4 PROJECTED VS. ACTUAL USE

The City's 2005 UWMP projected an overall recycled water demand of 7,045 AF in 2010. The industrial component of the demand was 6,765 AF and the landscape irrigation demand was 280 AF. The actual overall recycled water demand in fiscal year 2010 was lower than the projected demand at 6,457 AF (8 percent less than projected). The individual projection for landscape irrigation was measured at 211 AF (less than projected). The industrial demands were measured at 6,246 AF (about 7 percent less than projected).

Figure 8.3: Hyperion Provides the City with over 6,000 AFY of Recycled Water Annually

8.5 POTENTIAL USERS

Potential recycled water use within the City has been studied extensively over the past few years. **Table 8.5** on the following page summarizes potential users of recycled water within the City and their projected demands. These potential users have not been recommended for connection at this time. However, they may be in the future. The potential users are listed in **Table 8.5** are not included in the projected use of **Table 8.4**. The pace of conversion to recycled water in the future is dependent on the construction of WBMWD's Recycled Water Main Extensions in the City.

Table 8.5
Potential Recycled Water Users
(2025-2035)

User	Demand (AFY)	User	Demand (AFY)
Arnold Elementary	3	Levy Center	9
Caltrans @ Yukon	1	Little League Fields	18
Carr Elementary	5	North Torrance High	20
CSDLAC	150	Sea-Aire Golf	15
Delthorn Park	12	Seaside Elementary	6
De Portola Park	28	Saint Catherine School	5
Edison Elementary	4	Sequoia Real Estate Fund A & B	68
El Nido Park	17	Sequoia Real Estate Fund A (Greenwood)	15
El Retiro Park	5	Sequoia Real Estate Fund A (Hickory)	15
Fern Elementary	2	Sunflower Nursery	5
Greenwood Park	13	Torrance Park	14
Hamilton Adult School	7	Torrance High	17
Hickory Elementary	4	Walteria Elementary	5
Hickory Park	11	Walteria Park	6
Ishibashi (Madison)	12	Yukon Elementary	5
Lago Seco Park	13	---	---
Subtotal	**287**	**Subtotal**	**223**
Total = 510 AFY			

8.6 PROMOTING RECYCLED WATER

The City has prepared and adopted a reclaimed water ordinance, Ordinance No. 3392 (Appendix I) that provides a commitment from the City to encourage recycled water use. As a result, the City has adopted a recycled rate structure and incentive program provided in Appendix J. This program contains the following incentives:

1. Sets recycled water rate structure at 70 percent of the portable water rate

2. Pays for retrofit costs as follows:

   - City Departments – The Public Works Department shall construct and pay all costs of on-site irrigation system retrofits. The participating departments would receive a 30% savings on their water rate immediately.

   - Torrance Unified School District – The Public Works Department shall construct and pay up front costs for on-site irrigation system retrofits. Half of the on-site retrofit costs would be reimbursed to the Water Fund via an Agreement in which the Torrance Unified School District would continue to pay 100 percent of potable water rates for the recycled water until their half of the retrofit construction costs is recovered

   - Private Customers – Customer constructs and pays for all costs for retrofit or irrigation or industrial system. The City will have the option to do reimbursement agreements on a case-by-case basis.

WBMWD's marketing efforts have been successful in changing the perception of recycled water from merely a conservation tool with minimal application to a cost-effective business tool. The target customer is expanding from traditional irrigation users such as golf courses to commercial and industrial users.

Figure 8.3: Sea-Aire Golf Course

WBMWD encourages the use of recycled water by increasing marketing efforts as well as providing financial incentives. Financial incentives include wholesaling recycled water at a rate lower than potable water and funding plumbing retrofits to accept recycled water. WBMWD has projected the increase in recycled water demands due to these actions.

WBMWD provides other financial incentives as well that can assist potential customers not covered by the City's incentive program. Some potential recycled water users do not have the financial capability to pay for on-site plumbing retrofits necessary to accept recycled water. WBMWD advances funds for retrofit expenses and are subsequently reimbursed through monthly payments. The on-site facilities fees are amortized over a period of time up to ten years at WBMWD's cost of funds. Repayment is made using the

differential between potable and recycled water rates such that the customer never pays more than the potable rate. Once the loan is repaid, the rate reverts to the current recycled rates.

8.7 OPTIMIZING RECYCLED USE

The City's optimization plan is also covered by Ordinance 3392. The use of recycled water will be required if the following conditions exist:

a) Recycled water is available to the user and meets the requirements of the DHS.

b) The user of the recycled water will not cause any loss or diminution of any existing water right.

c) The irrigation system, recycled water distribution system, cross-connection control and monitoring methods can be designed to meet the standards required by the State of California.

d) Appropriate control measures can be provided in accordance with the standards of the State of California where the use of recycled water will, or might, create a mist

e) Recycled water service is both economically and technically feasible and cost competitive for prospective recycled water customers.

Another aspect of optimizing recycled water use is continual search for funding opportunities. Regarding funding options, the primary opportunities include low interest loans obtained through the State Revolving Fund, and participation by MWD through its LRP which provide up to $250 AFY rebate for recycled water used to offset imported water.

The City partners with WBMWD for the use of recycled water. WBMWD will construct recycled water mains to any site that will provide a revenue to cost ratio of one or greater. The use of recycled water by ExxonMobil, American Honda Motor Company, and the Toyota Motors south campus came about from the cooperative efforts of WBMWD, the City and those private entities. The construction of recycled water mains made it possible for TMW to retrofit Magruder Middle School and Columbia Park with only the on-site retrofit costs paid by the City. WBMWD has extended their main from ExxonMobil to Wilson Park as the next phase in the WMBWD Master Plan to bring recycled water to golf courses and a cemetery on the Palos Verdes Peninsula.

When the revenue to expense ratio has been less than one, the City has partnered with WBMWD to contribute funds to the construction of recycled water mains. This was the case for the Artesia Boulevard Recycled Water Main Project that connected Artesia Boulevard medians, McMaster Park, Descanso Park, Guenser Park, Casimer Middle School and Arlington Elementary School.

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Appendix A: References

City of Torrance 2010 Urban Water Management Plan

References

1. City of Torrance. "2005 Urban Water Management Plan"
2. Metropolitan Water District of Southern California. "2010 MWD Regional Urban Water Management Plan (RUWMP)" December, 2010
3. Metropolitan Water District of Southern California. "2010 MWD Integrated Resources Plan (IRP) Update" July, 2010
4. http://www.worldclimate.com/ "Weather, rainfall, and temperature data" June, 2011
5. Metropolitan Water District of Southern California. "Chapter IV - Groundwater Basin Reports Los Angeles Coastal Plain Basins - West Coast Basin" September, 2007
6. California Department of Water Resources. "West Coast Groundwater Basin" (Bulletin 118) February, 2004
7. California Department of Water Resources. "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" February, 2011
8. City of Torrance. "Water Conservation Ordinance" Ordinance No. 3717
9. City of Torrance: Ordinance 3392: Chapter VI Article V: Reclaimed Water
10. City of Torrance: Water Production/Sales Data
11. City of Torrance: Excerpts from 2008 Business Plan: Section IV - Water Supply Diversification and Water Quality Regulations
12. AECOM: City of Torrance North Torrance Well Field Project Draft Preliminary Design Report

Appendix B: UWMP Act

City of Torrance 2010 Urban Water Management Plan

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
AB 2552, Bates, 2000
SB 553, Kelley, 2000
SB 610, Costa, 2001
AB 901, Daucher, 2001
SB 672, Machado, 2001
SB 1348, Brulte, 2002
SB 1384, Costa, 2002
SB 1518, Torlakson, 2002
AB 105, Wiggins, 2004
SB 318, Alpert, 2004
SB 1087, Florez, 2005
SBX7 7, Steinberg, 2009

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

CHAPTER 2. DEFINITIONS

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS
Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)

(1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the

past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e)

(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the ‘‘Memorandum of Understanding Regarding Urban Water Conservation in California,’’ dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

(k) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5 Water Service Reliability

10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled

pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Articl 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall file with the department and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be filed with the department and any city or county within which the supplier provides water supplies within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water

supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

10657.

(a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

Appendix C: DWR UMWP Checklist

City of Torrance 2010 Urban Water Management Plan

Table I-1 Urban Water Management Plan checklist, organized by legislation number

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
1	Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	10608.20(e)	System Demands		**Section 4.5**
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	System Demands	Retailer and wholesalers have slightly different requirements	**Section 1.2** **Appendix D**
3	Report progress in meeting urban water use targets using the standardized form.	10608.40	Not applicable	Standardized form not yet available	**Not Applicable**
4	Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	10620(d)(2)	Plan Preparation		**Section 1.2** **Appendix D**
5	An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.	10620(f)	Water Supply Reliability . . .		**Section 2** **Section 4** **Section 5** **Section 7**
6	Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.	10621(b)	Plan Preparation		**Section 1.2** **Appendix D**
7	The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).	10621(c)	Plan Preparation		**Section 1.1** **Section 1.2** **Appendix D**
8	Describe the service area of the supplier	10631(a)	System Description		**Section 1.5** **Figure 1.4**
9	(Describe the service area) climate	10631(a)	System Description		**Section 1.6**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
10	(Describe the service area) current and projected population . . . The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier . . .	10631(a)	System Description	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	**Section 1.7** Projections based on most recent US Census and City's growth rate.
11	. . . (population projections) shall be in five-year increments to 20 years or as far as data is available.	10631(a)	System Description	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	**Section 1.7**
12	Describe . . . other demographic factors affecting the supplier's water management planning	10631(a)	System Description		**Section 1.7** City has significant daytime populations.
13	Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).	10631(b)	System Supplies	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	**Section 2** Groundwater Imported Water Goldsworthy Desalter Recycled Water

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
14	(Is) groundwater . . . identified as an existing or planned source of water available to the supplier . . .?	10631(b)	System Supplies	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	**Section 2** Yes groundwater is a source of supply
15	(Provide a) copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management. Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)	System Supplies		**Groundwater Management Plan is not available.**
16	(Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater.	10631(b)(2)	System Supplies		**Section 2.2 "Groundwater"**
17	For those basins for which a court or the board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or the board	10631(b)(2)	System Supplies		**Appendix F**
18	(Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.	10631(b)(2)	System Supplies		**City may pump up to 5,640 AFY**
19	For basins that have not been adjudicated, (provide) information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.	10631(b)(2)	System Supplies		**Not Applicable**
20	(Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.	10631(b)(3)	System Supplies		**Section 2.2 "Groundwater"** ***Groundwater Production*** **Page 2-7**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
21	(Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.	10631(b)(4)	System Supplies	Provide projections for 2015, 2020, 2025, and 2030.	**Section 2.2 "Groundwater" (Description)** **Section 5.4 Tables 5.4-5.10 (analysis)**
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) An average water year, (B) A single dry water year, (C) Multiple dry water years.	10631(c)(1)	Water Supply Reliability . . .		**Section 5 (Tables 5.4-5.10)**
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)	Water Supply Reliability . . .		**Section 5; Section 7** During times of groundwater or imported supply interruption, City will import or extract water and implement its Conservation Plan
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)	System Supplies		**Section 2.6**
25	Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof;(I) Agricultural.	10631(e)(1)	System Demands	Consider “past” to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	**Section 4**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
26	(Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) Water survey programs for single-family residential and multifamily residential customers; (B) Residential plumbing retrofit; (C) System water audits, leak detection, and repair; (D) Metering with commodity rates for all new connections and retrofit of existing connections; (E) Large landscape conservation programs and incentives; (F) High-efficiency washing machine rebate programs; (G) Public information programs; (H) School education programs; (I) Conservation programs for commercial, industrial, and institutional accounts; (J) Wholesale agency programs; (K) Conservation pricing; (L) Water conservation coordinator; (M) Water waste prohibition;(N) Residential ultra-low-flush toilet replacement programs.	10631(f)(1)	DMMs	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	**Section 6**
27	A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.	10631(f)(3)	DMMs		**Section 6**
28	An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.	10631(f)(4)	DMMs		**Section 6**
29	An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following: (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors; (2) Include a cost-benefit analysis, identifying total benefits and total costs; (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost; (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.	10631(g)	DMMs	See 10631(g) for additional wording.	**Not Applicable (See Section 6)**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
30	(Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.	10631(h)	System Supplies		**Section 2.7** **Section 5.6**
31	Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.	10631(i)	System Supplies		**Section 2.5** No plans for desalination.
32	Include the annual reports submitted to meet the Section 6.2 requirement (of the MOU), if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	DMMs	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	**Not Applicable/Section 6** Although City is a member of CUWCC, City does not submit annual reports.
33	Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).	10631(k)	System Demands	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	**Section 2** **Section 5.4** Tables 5.4-5.10 deal with imported water supply available from MWD. Groundwater supply is also shown up 2035.

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
34	The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)	System Demands		**Section 4.7**
35	Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.	10632(a)	Water Supply Reliability . . .		**Section 7.2** ***Stages of Action***
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)	Water Supply Reliability . . .		**Section 7.3**
37	(Identify) actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)	Water Supply Reliability . . .		**Section 7.4**
38	(Identify) additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)	Water Supply Reliability . . .		**Section 7.5**
39	(Specify) consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)	Water Supply Reliability . . .		**Section 7.5**
40	(Indicated) penalties or charges for excessive use, where applicable.	10632(f)	Water Supply Reliability . . .		**Section 7.5**
41	An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)	Water Supply Reliability . . .		**Section 7.6**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
42	(Provide) a draft water shortage contingency resolution or ordinance.	10632(h)	Water Supply Reliability . . .		**Section 7.7** **Appendix G**
43	(Indicate) a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)	Water Supply Reliability . . .		**Section 7.8**
44	Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area	10633	System Supplies		**Section 2** **Section 8**
45	(Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)	System Supplies		**Section 8**
46	(Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)	System Supplies		**Section 2** **Section 8**
47	(Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)	System Supplies		**Section 2** **Section 8**
48	(Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)	System Supplies		**Section 8**
49	(Describe) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.	10633(e)	System Supplies		**Section 2** **Section 5** **Section 8**
50	(Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.	10633(f)	System Supplies		**Section 8**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
51	(Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)	System Supplies		**Section 8**
52	The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.	10634	Water Supply Reliability . .	For years 2010, 2015, 2020, 2025, and 2030	**Section 3**
53	Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)	Water Supply Reliability . .		**Section 5**
54	The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.	10635(b)	Plan Preparation		**To be performed**
55	Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642	Plan Preparation		**Section 1.2** **Appendix D**

No.	UWMP requirement [a]	Calif. Water Code reference	Subject [b]	Additional clarification	UWMP location
56	Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.	10642	Plan Preparation		**Section 1.2** **Appendix D**
57	After the hearing, the plan shall be adopted as prepared or as modified after the hearing.	10642	Plan Preparation		**Section 1.2** **Appendix D**
58	An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.	10643	Plan Preparation		**Section 1.1**
59	An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.	10644(a)	Plan Preparation		**To be performed**
60	Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.	10645	Plan Preparation		**To be performed**

a The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

b The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

Appendix D: Coordination, Public Notice, & City Council Resolution Adopting 2010 UWMP

City of Torrance 2010 Urban Water Management Plan

Council Meeting of
July 21, 2009

Honorable Mayor and Members
of the City Council
City Hall
Torrance, California

Members of the Council:

SUBJECT: Public Works – Approve a RESOLUTION authorizing activation of a Level 1 Water Supply Shortage Condition in accordance the City's Water Conservation Ordinance 3717 and authorize the implementation of an enhanced conservation program to reduce potable (drinking) water consumption by 10%. Expenditure: None

RECOMMENDATION

Recommendation of the Water Commission and the Public Works Director that the City Council approve a **RESOLUTION** authorizing activation of a Level 1 Water Supply Shortage Condition in accordance with Section 76.4.070 of the City's Water Conservation Ordinance 3717 to declare an urgent water shortage condition and requires that all municipal customers reduce their water consumption by 10%. The activation of the Level 1 shortage condition would increase mandatory measures by limiting outdoor watering to three days per week, prohibit outdoor watering from 9 a.m. until 5 p.m., and require that all water leaks be repaired within seven days.

Funding

There is no additional funding required at this time.

BACKGROUND AND ANALYSIS

The City Council adopted an updated Water Conservation Ordinance (Ordinance Number 3717) on March 24, 2009 to replace an existing Ordinance in place since 1991. The new Ordinance sets forth various water use regulations and restrictions, along with establishing financial penalties for repeated violators who do not comply with water waste prohibitions. The focus of the Ordinance is the elimination of wasteful use of potable (drinking) water supplies. The Ordinance prohibits various wasteful water practices such as excessive watering of landscapes, irrigating landscapes in the late morning and afternoon, washing down exterior hard surfaces and other related inappropriate water use practices. Elimination of wasteful water practices has the potential to cut water use in the region by approximately 10%

A Level 1 Water Supply condition is activated when MWD calls for extraordinary water conservation of up to 15%. Since MWD has declared mandatory reductions in imported water deliveries to all of its member agencies, it is appropriate to activate the Level 1 stage of the City's Conservation Ordinance, in accordance with Section 75.4.070 of the Ordinance. In addition to the permanent measures already in place, the Level 1 stage would: prohibit outdoor watering between the hours of 9 a.m. and 5 p.m.; limit outdoor watering to three days per week; and require all water leaks to be fixed within seven days.

In lieu of penalty rates, it is proposed that TMW implement an enhanced conservation program calling for an additional 10% reduction in potable water use. The conservation program

12D

RESOLUTION NO. 2011-71

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TORRANCE AUTHORIZING ADOPTION OF AN URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Legislature enacted Assembly Bill 2853 during the 1994 Session of the California Legislature (an act to amend California Water Code Division 6, Part 2.6 Urban Water Management Planning Act), Water Code Section 10610 et seq.; and

WHEREAS, the California Legislature enacted Assembly Bill 2853 during the 1994 Session of the California Legislature (an act to amend California Water Code Division 6, Part 2.6 Urban Water Management Planning Act), Water Code Section 10610 et seq.; and

WHEREAS, AB 2853 mandates that every urban water supplier providing municipal water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to develop an Urban Water Management Plan; and

WHEREAS, AB 2853 mandates that the Plan be updated at least once every five years; and

WHEREAS, the waters of the State are limited and renewable resource subject to ever-increasing demands; and

WHEREAS, a long term, reliable supply of water is essential and urban water management plans are required to actively pursue the efficient use of available supplies; and

WHEREAS, the City's current Urban Water Management Plan must be revised and filed with the California Department of Water Resources by August 1, 2011; and

WHEREAS, the City of Torrance has completed an update to its 2005 Urban Water Management Plan (2010 Plan) pursuant to the requirements of the Urban Water Management Plan; and

WHEREAS, the purpose of the 2010 Plan is to provide a local analysis of the current and alternative water demand, supplies and conservation activities of the City; and

WHEREAS, the Urban Water Management Plan incorporates a Water Shortage Contingency Plan as an element of the subject plan to outline courses of action in the event of a drought or emergency water shortage condition; and

WHEREAS, the City of Torrance is an urban supplier of water providing service to more than 3,000 customers, and has, therefore, prepared for public review a Draft Urban Water Management Plan, in compliance with the requirements of AB 2853, and a properly noticed public hearing regarding the Plan was held by the City Council on June 21, 2010, and a Final Urban Water Management Plan prepared.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Torrance as follows:

SECTION 1

The subject Urban Water Management Plan is hereby adopted and ordered filed with the City Clerk.

SECTION 2
The City Manager is hereby authorized and directed to file this Plan with the California Department of Water Resources.

Introduced, approved and adopted this 21st day of June, 2011.

/s/ Frank Scotto
Mayor Frank Scotto
ATTEST:

/s/ Sue Herbers
Sue Herbers, CMC
City Clerk

APPROVED AS TO FORM:
JOHN L. FELLOWS III, City Attorney

by /s/ Patrick Q. Sullivan
Patrick Q. Sullivan, Assistant City Attorney

TORRANCE CITY COUNCIL RESOLUTION NO. 2011-71

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss
CITY OF TORRANCE)

I, Sue Herbers, City Clerk of the City of Torrance, California, do hereby certify that the foregoing resolution was duly introduced, approved, and adopted by the City Council of the City of Torrance at a regular meeting of said Council held on the 21st day of June, 2011 by the following roll call vote:

AYES:	COUNCILMEMBERS	Barnett, Brewer, Furey, Numark, Rhilinger, Sutherland, and Mayor Scotto.
NOES:	COUNCILMEMBERS	None.
ABSTAIN:	COUNCILMEMBERS	None.
ABSENT:	COUNCILMEMBERS	None.

/s/ Sue Herbers
Sue Herbers, CMC
City Clerk of the City of Torrance

Date: June 30, 2011

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) SS
CITY OF TORRANCE)

This is to certify that the foregoing is a true and correct copy of the original document.
Dated: June 30, 2011

SUE HERBERS, City Clerk

Daily Breeze

21250 HAWTHORNE BLVE, STE 170 * TORRANCE CALIFORNIA 90503-4077
Direct: (310) 543-6635 Fax: (310) 316-6827

PROOF OF PUBLICATION
(201 5.5 C.C.P.)

STATE OF CALIFORNIA

County of Los Angeles,

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of the THE DAILY BREEZE

a newspaper of general circulation, printed and published

in the City of Torrance*
County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of County of Los Angeles, State of California, under the date of

June 10, 1974

Case Number SWC7146
that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement there of on the following dates, to-wit

June 7, 14,

all in the year 2011

the foregoing is true and correct.
Dated at Torrance

California, this 14 June 2011

*The Daily Breeze circulation includes the following cities: Carson, Compton, Culver City, El Segundo, Gardena, Harbor City, Hawthorne, Hermosa Beach, Inglewood, Lawndale, Lomita, Long Beach, Manhattan Beach, Palos Verdes Peninsula, Palos Verdes, Rancho Palos Verdes, Rancho Palos Verdes Estates, Redondo Beach, San Pedro, Santa Monica, Torrance and Wilmington

This space is for the County Clerk's Filing Stamp

RECEIVED
2011 JUN 16 AM 10: 05
CLERK'S OFFICE

Proof of Publication of

DB 6-14

PUBLIC NOTICE

NOTICE OF PUBLIC HEARING BEFORE THE CITY COUNCIL OF THE CITY OF TORRANCE URBAN WATER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN: That the City Council of the City of Torrance will hold a public hearing to consider the City's 2010 Urban Water Management Plan in accordance with Section 10642 of the Urban Water Management Planning Act of 1983, as amended. The purpose of the hearing will be to solicit public comment prior to the adoption of the plan.

Copies of the Urban Water Management Plan are available for public inspection at the City of Torrance, Public Works Department, 20500 Madrona Avenue, Torrance, California and the City Clerk's Office at 3031 Torrance Boulevard, Torrance, California. Additional information on the above plan and/or public hearing may be obtained by contacting Pamela Lewis at (310) 781-6900.

This matter will be heard on June 21, 2011, at 7:00 p.m., or as soon as possible thereafter, at the Council Chambers at City Hall, 3031 Torrance Boulevard, California. All persons interested in this matter are notified to appear at this time.

Pub: June 07, 14, 2011

Appendix E: SBx7-7 Baseline & Target Spreadsheet

City of Torrance 2010 Urban Water Management Plan

Table E-1
Torrance Municipal Water
Actual Water Consumption (FY 1996-2010)

Yr.	MWD	Desalter	Wells	Wholesale	Total Pot. Consumption	Service Area Population	GPCD
95-96	23,297	0	1,416	800	23,912	94,702	225
96-97	22,995	0	2,062	800	24,257	94,834	228
97-98	20,072	0	4,843	800	24,114	95,661	225
98-99	21,683	0	3,378	800	24,261	96,371	225
99-00	21,013	0	2,036	800	22,250	97,799	203
00-01	20,953	0	2,026	908	22,072	98,330	200
01-02	22,817	245	1,832	1,470	23,424	98,864	212
02-03	21,655	1,709	611	888	23,087	99,401	207
03-04	20,517	2,446	1,674	2,538	22,099	99,941	197
04-05	20,046	2,082	1,118	1,609	21,637	100,484	192
05-06	21,338	1,779	0	2,005	21,112	101,030	187
06-07	21,100	2,005	884	1,515	22,475	101,578	198
07-08	19,306	1,271	1,487	682	21,382	102,130	187
08-09	19,352	646	674	821	19,851	102,685	173
09-10	16,471	1,181	1,106	571	18,187	103,111	157
Total potable consumption in TMW service area = MWD + Desalter + Wells - Wholesale							
					Recent 3-Yr. Ave. (FY 2008-2010)		**172**

For purposes of Supply and Demand Evaluation in Section 5, 172 GPCD will be used to project future demand when multiplied by population projections.

Table E-2
Torrance Municipal Water
SBx7-7 Baseline Consumption (FY 1996-2010)
With 2015 and 2020 Targets

Yr.	MWD	Desalter	Wells	Process	Wholesale*	Total Pot. Consumption	Service Area Population	GPCD
95-96	23,297	0	1,416	2,968	800	20,237	94,702	191
96-97	22,995	0	2,062	4,511	800	18,715	94,834	176
97-98	20,072	0	4,843	5,546	800	16,147	95,661	151
98-99	21,683	0	3,378	3,640	800	18,932	96,371	175
99-00	21,013	0	2,036	1,763	800	19,468	97,799	178
00-01	20,953	0	2,026	1,875	908	19,184	98,330	174
01-02	22,817	245	1,832	3,546	1,470	18,839	98,864	170
02-03	21,655	1,709	611	2,580	888	19,347	99,401	174
03-04	20,517	2,446	1,674	2,532	2,538	17,507	99,941	156
04-05	20,046	2,082	1,118	2,447	1,609	17,590	100,484	156
05-06	21,338	1,779	0	2,220	2,005	18,002	101,030	159
06-07	21,100	2,005	884	2,311	1,515	18,719	101,578	165
07-08	19,306	1,271	1,487	2,543	682	17,460	102,130	153
08-09	19,352	646	674	2,231	821	16,960	102,685	147
09-10	16,471	1,181	1,106	1,850	571	15,193	103,111	132
**Total potable consumption Applicable to SBx7-7 = MWD + 1/2 Desalter + 1/2 Wells - Process - Wholesale								
							5-Yr. Baseline (FY 2006-2010)	**151**
							Minimum Reduction	**143**
							Baseline (FY 2001-2010)	**159**
							2020 Target (80% of Baseline)	**127**
							2020 Target (95% of Regional)	**141.5**
							Final 2020 Target	**141.5**
							Final 2015 Target	**150**
							Recent (FY 2010) Use	**132**

*Due to the lack of data relating to Wholesale Water prior to 2000 (estimate of 800 AFY), TMW has selected FY 2001-2010 as its 10-yr. Baseline in order to preserve the integrity of its data.

**SBx7-7 consumption based on allowable reductions

The Final 2020 Compliance Target for Torrance Municipal Water is 141.5 GPCD.

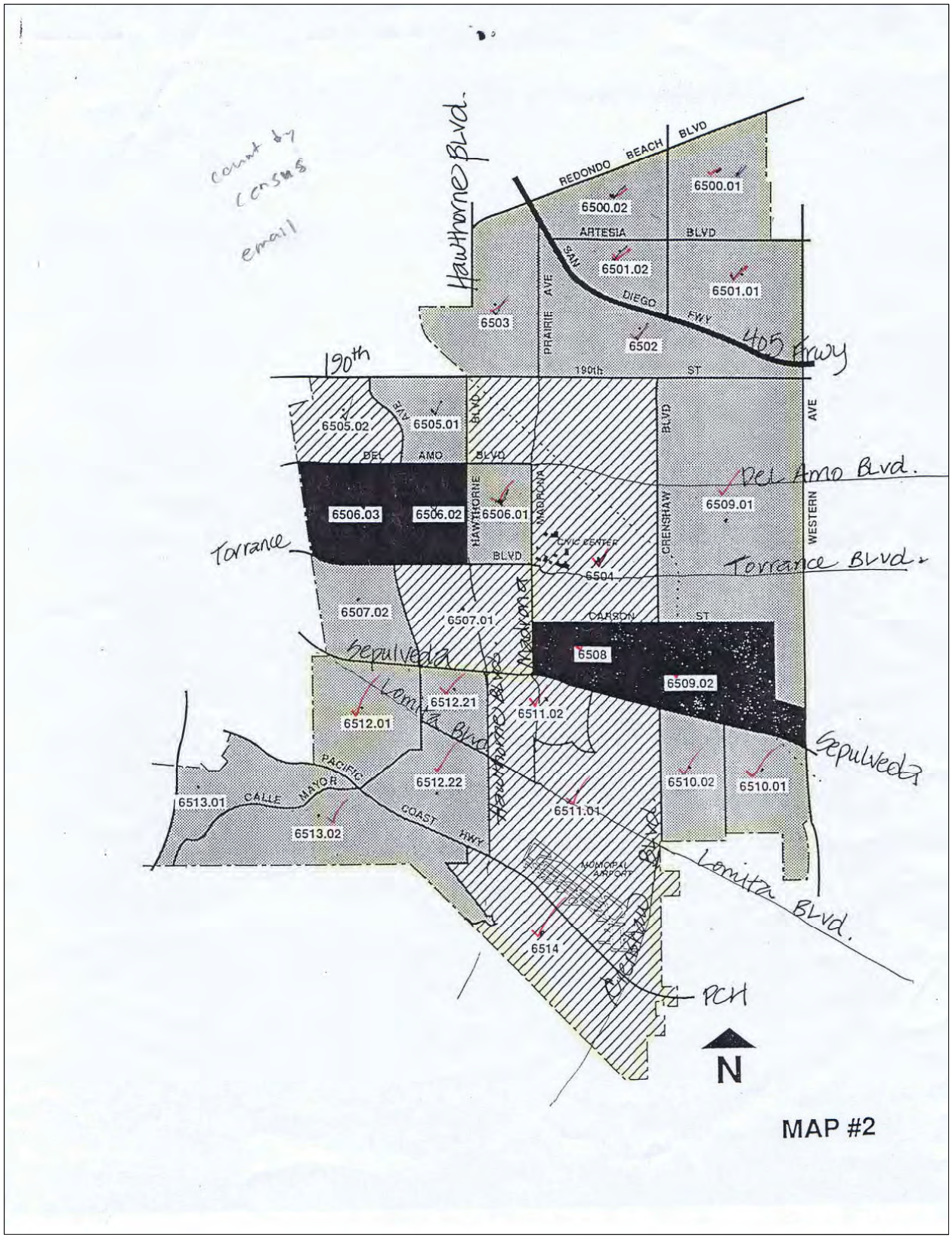
Supporting data can be found in this Appendix.

City of Torrance
Population by Year 2000 Census Tracts

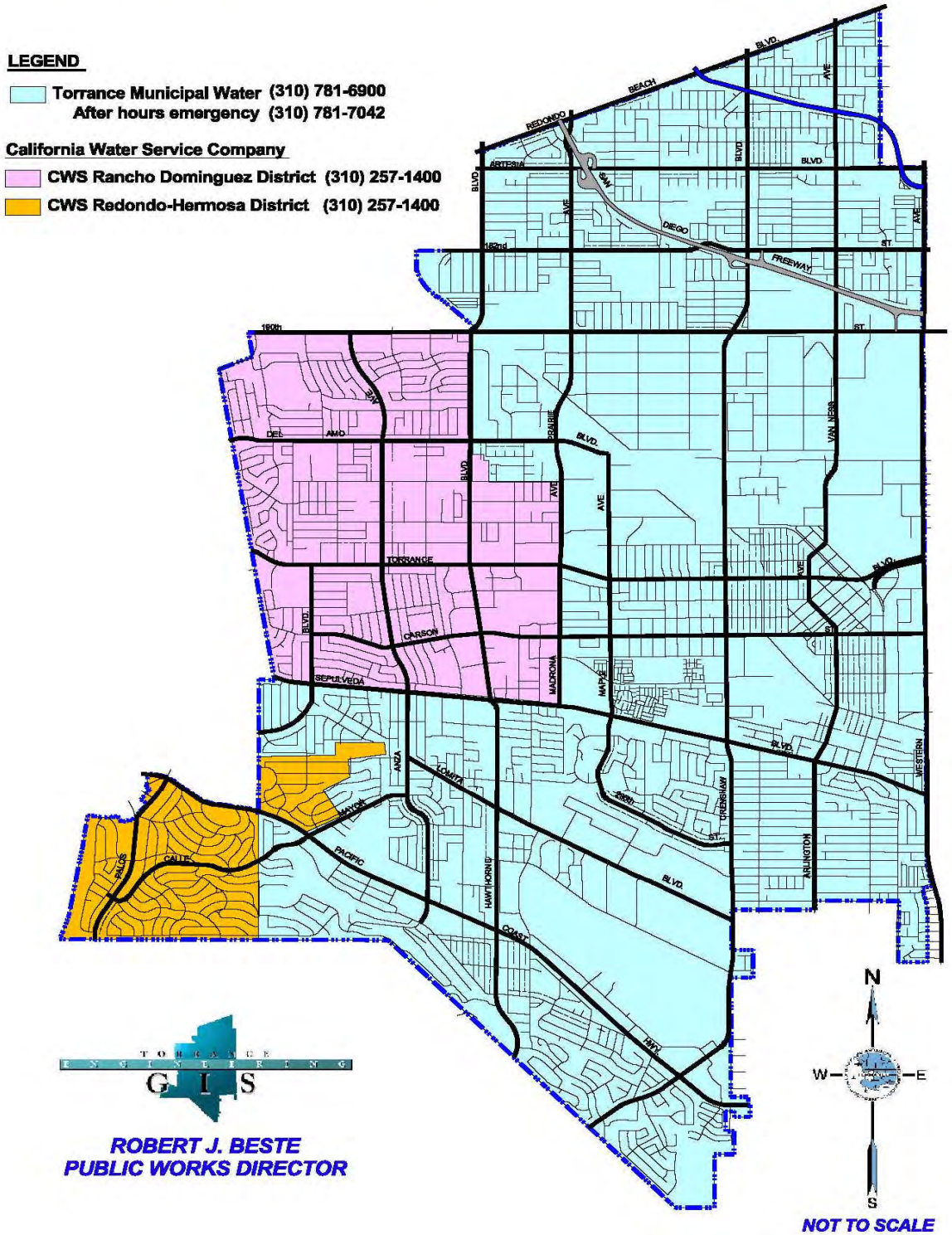
Census Tract	Tract Population	Population Served by TMW
6500.01	5,890	5,890
6500.02	7,136	7,136
6501.01	5,542	5,542
6501.02	2,266	2,266
6502	5,721	5,721
6503	6,439	6,439
6504	3,980	3,980
6506.01	**7,818**	**1,209**
6508	5,783	5,783
6509.01	5,430	5,430
6509.02	5,856	5,856
6510.01	5,057	5,057
6510.02	4,516	4,516
6511.01	5,029	5,029
6511.02	3,355	3,355
6512.01	**5,040**	**3,760**
6512.21	3,012	3,012
6512.22	5,814	5,814
6513.02	**6,046**	**3,587**
6514	8,417	8,417
Totals :	**108,147**	**97,799**

Total Year 2000 City Population:	**137,946**
Percent Population served by TMW:	**70.9%**
Current Population Served by TMW:	**103,111**

See following pages for breakdown of Census Tracts 6506.01, 6512.01, and 6513.02.


count by
census
email
Hawthorne Blvd.
REDONDO BEACH BLVD
6500.02
6500.01
ARTESIA BLVD
6501.02
6501.01
SAN DIEGO FWY
405 Fwy
6503
PRAIRIE AVE
6502
190th
190th ST
6505.02
6505.01
DEL AMO BLVD
Del Amo Blvd.
6506.03
6506.02
6506.01
HAWTHORNE BLVD
MADRONA
CIVIC CENTER
6504
CRENSHAW BLVD
6509.01
WESTERN AVE
Torrance
Torrance Blvd.
6507.02
6507.01
CARSON ST
6508
6509.02
Sepulveda
Lomita Blvd
6512.01
6512.21
6511.02
PACIFIC COAST HWY
6512.22
6513.01
CALLE MAYOR
6513.02
6511.01
6510.02
6510.01
MUNICIPAL AIRPORT
6514
PCH
N
MAP #2

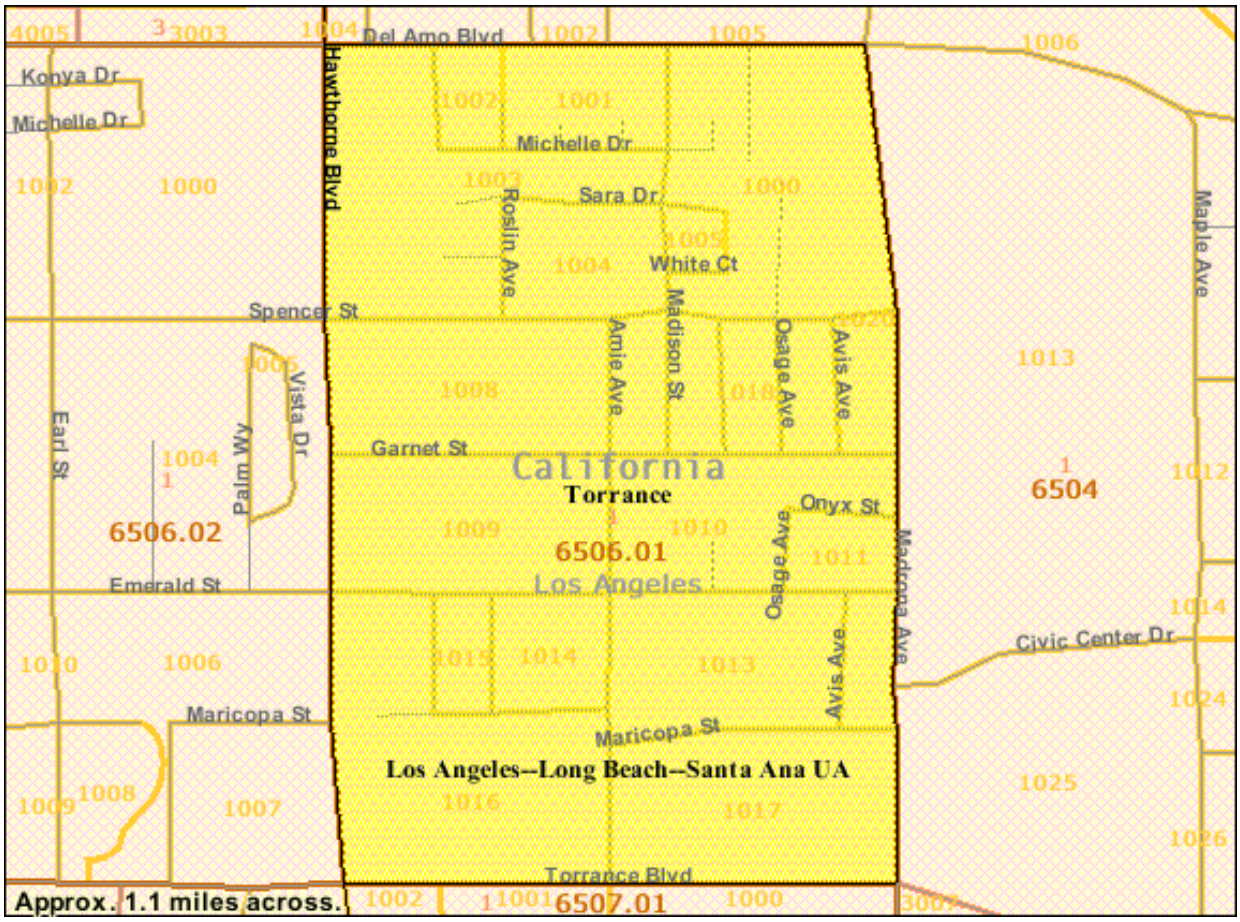
CITY OF TORRANCE WATER PURVEYORS



TORRANCE ENGINEERING GIS

ROBERT J. BESTE
PUBLIC WORKS DIRECTOR

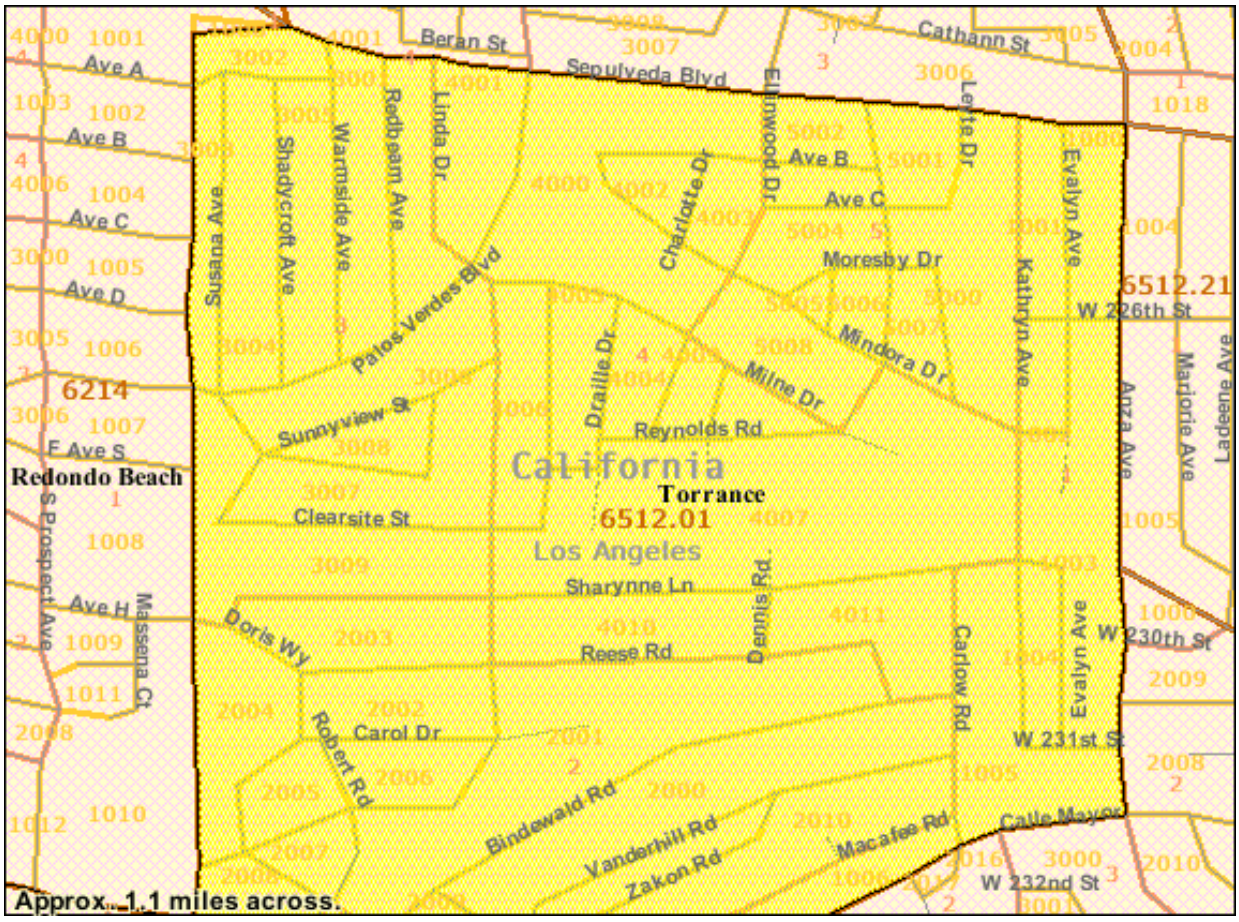
NOT TO SCALE



Census Tract 6506.01

TMW Serves all or most of Blocks 1000, 1001, 1002, 1003, 1004, and 1005 located on the Northern portion of Tract 6506.01:

Block	Population
1000	557
1001	251
1002	166
1003	173
1004	30
1005	32
Total:	1,209

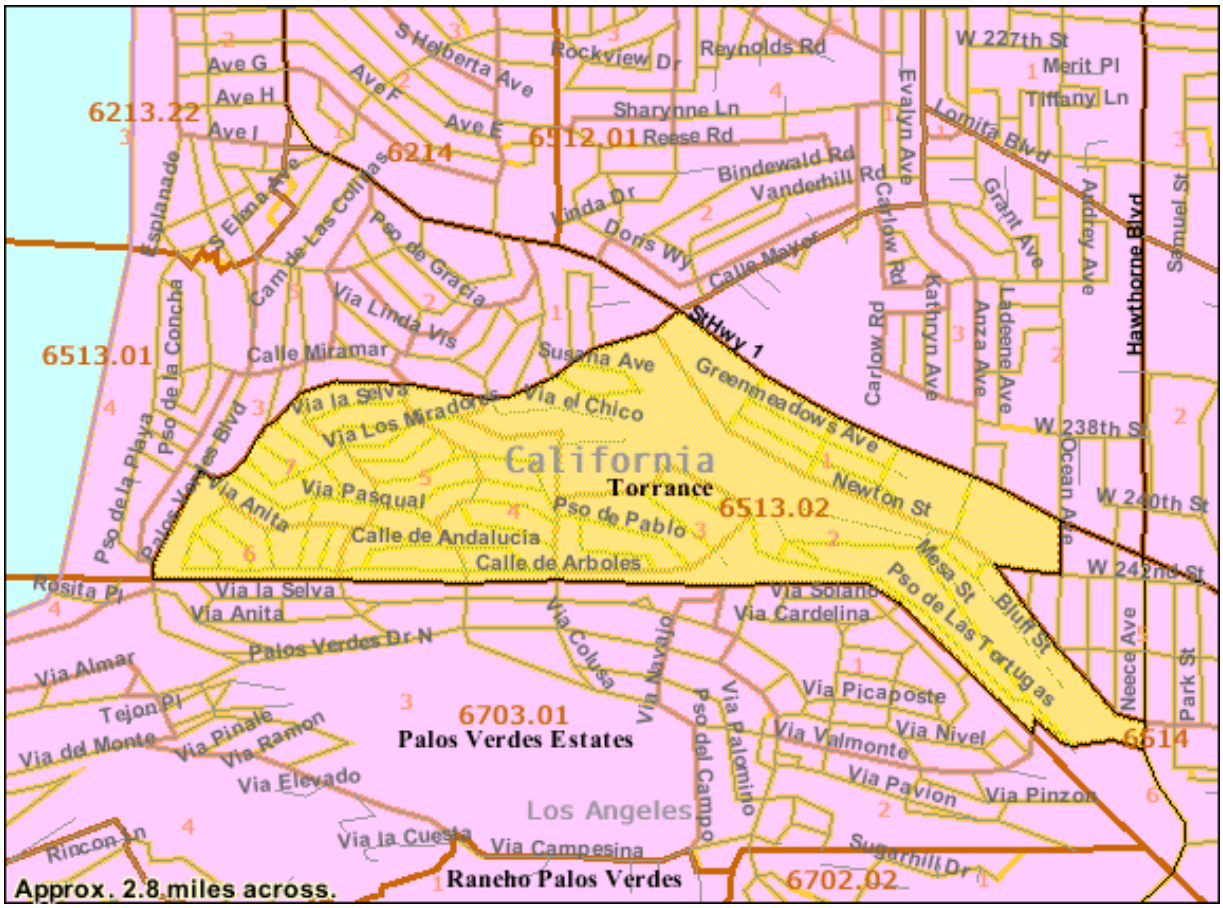


Census Tract 6512.01

TMW Serves Block Groups 1, 3, 5, and most of 4 (Serves a portion of Block Group 2)*

Block Group	Population
1	903
3	1,046
4	1,213
5	598
Total:	3,760

*For purposes of Tract 6512.01 population, 100% of Block Group 4 is included and Block Group 2 is neglected.



Census Tract 6513.02

TMW Serves Block Groups 1, 2, and 3 (Does not serve Block Groups 4, 5, 6, & 7)

Block Group	Population
1	1,100
2	1,950
3	537
Total:	3,587

Appendix F: West Coast Basin Judgment

City of Torrance 2010 Urban Water Management Plan

West Coast Basin Judgment

California Water Service Company, et al. vs. City of Compton, et al.

Table of Contents

INTRODUCTION

The above - entitled matter came on regularly for further trial before the Honorable George Francis, Judge of the Superior Court of the State of California, assigned by the Chairman of the Judicial Council to sit in this case on Friday the 21st day of July, 1961. Thereupon plaintiffs filed a dismissal of the action as to certain defendants named in the Complaint and in the Amended Complaint herein who are not mentioned or referred to in Paragraph III of this Judgment, and the further trial of the action proceeded in respect to the remaining parties.

The objections to the Report of Referee and to all supplemental Reports thereto, having been considered upon exceptions thereto filed with the Clerk of the Court in the manner of and within the time allowed by law, were overruled.

Oral and documentary evidence was introduced, and the matter was submitted to the Court for decision. Findings of Fact, Conclusions of Law and Judgment herein have heretofore been signed and filed.

Pursuant to the reserved and continuing jurisdiction of the Court under the Judgment herein, certain amendments to said Judgment and temporary Orders have heretofore been made and entered.

Continuing jurisdiction of the Court under said Judgment is currently assigned to the HONORABLE JULIUS M. TITLE.

The motion of defendant herein, DOMINGUEZ WATER CORPORATION, for further amendments to the Judgment, notice thereof and of the hearing thereon having been duly and regularly given to all parties, came on for hearing in Department 48 of the above-entitled Court on March 21, 1980, at 1:30 o'clock P.M., before said HONORABLE JULIUS M. TITLE. Defendant, DOMINGUEZ WATER CORPORATION, was represented by its attorneys, Helm, Budinger & Lemieux, and Ralph B. Helm. Various other parties were represented by counsel of record appearing on the Clerk's records. Hearing thereon was concluded on that date. The within "Amended Judgment" incorporates amendments and orders heretofore made to the extent presently operable and amendments pursuant to said last mentioned motion. To the extent this Amended Judgment is a restatement of the Judgment as heretofore amended, it is for convenience in incorporating all matters in one document, it is not a readjudication of such matters and is not intended to reopen any such matters. As used hereinafter the word "Judgment" shall include the original Judgment as amended to date.

NOW, THEREFORE, IT IS HEREBY ORDERED, ADJUDGED AND DECREED AS FOLLOWS:

I. Existence of Basin and Boundaries Thereof.

There exists in the County of Los Angeles, State of California, an underground water basin or reservoir known and hereinafter referred to as "West Coast Basin", "West Basin" or the "Basin", and the boundaries thereof are described as follows:

Commencing at a point in the Baldwin Hills about 1300 feet north and about 100 feet west of the intersection of Marvale Drive and Northridge Drive; thence through a point about 200 feet northeasterly along Northridge Drive from the intersection of Marvale and Northridge Drives to the base of the escarpment of the Potrero fault; thence along the base of the escarpment of the Potrero fault in a straight line passing through a point about 200 feet south of the intersection of Century and Crenshaw Boulevards and extending about 2650 feet beyond this point to the southerly end of the Potrero escarpment; thence from the southerly end of the Potrero escarpment in a line passing about 700 feet south of the intersection of Western Avenue and Imperial Boulevard and about 400 feet north of the intersection of El Segundo Boulevard and Vermont Avenue and about 1700 feet south of the intersection of El Segundo Boulevard and Figueroa Street to the northerly end of the escarpment of the Avalon-Compton fault at a point on said fault about 700 feet west of the intersection of Avalon Boulevard and Rosecrans Avenue; thence along the escarpment of the Avalon-Compton fault to a point in the Dominguez Hills located about 1300 feet north and about 850 feet west of the intersection of Central Avenue and Victoria Street; thence along the crest of the Dominguez Hills in a straight line to a point on Alameda Street about 2900 feet north of Del Amo Boulevard as measured along Alameda Street; thence in a straight line extending through a point located on Del Amo Boulevard about 900 feet west of the Pacific Electric Railway to a point about 100 feet north and west of the intersection of Bixby Road and Del Mar Avenue; thence in a straight line to a point located about 750 feet west

and about 730 feet south of the intersection of Wardlow Road and Long Beach Boulevard at the escarpment of the Cherry Hill fault; thence along the escarpment of the Cherry Hill fault through the intersection of Orange Avenue and Willow Street to a point about 400 feet east of the intersection of Walnut and Creston Avenues; thence to a point on Pacific Coast Highway about 300 feet west of its intersection with Obispo Avenue; thence along Pacific Coast Highway easterly to a point located about 650 feet west of the intersection of the center line of said Pacific Coast Highway with the intersection of the center line of Lakewood Boulevard; thence along the escarpment of the Reservoir Hill fault to a point about 650 feet north and about 700 feet east of the intersection of Anaheim Street and Ximeno Avenue; thence along the trace of said Reservoir Hill fault to a point on the Los Angeles - Orange County line about 1700 feet northeast of the Long Beach City limit measured along the County line; thence along said Los Angeles - Orange County line in a southwesterly direction to the shore line of the Pacific Ocean; thence in a northerly and westerly direction along the shore line of the Pacific Ocean to the intersection of said shore line with the southerly end of the drainage divide of the Palos Verdes Hills; thence along the drainage divide of the Palos Verdes Hills to the intersection of the northerly end of said drainage divide with the shore line of the Pacific Ocean; thence northerly along the shore line of the Pacific Ocean to the intersection of said shore line with the westerly projection of the crest of the Ballona escarpment; thence easterly along the crest of the Ballona escarpment to the mouth of Centinela Creek; thence easterly from the mouth of Centinela Creek across the Baldwin Hills in a line encompassing the entire watershed of Centinela Creek to the point of beginning.

All streets, railways and boundaries of Cities and Counties herinabove referred to are as the same existed at 12:00 o'clock noon on August 20, 1961.

The area included within the foregoing boundaries is approximately 101,000 acres in extent.

II. Definitions:

1 Basin, West Coast Basin and West Basin, as these terms are interchangeably used herein, mean the ground water basin underlying the area described in Paragraph I hereof.

2 A fiscal year, as that term is used herein, is a twelve month period beginning July 1 and ending June 30.

3 A water purveyor, as that term is used in Paragraph XII hereof, means a party which sells water to the public, whether a regulated public utility, mutual water company or public entity, which has a connection or connections for the taking of imported water through The Metropolitan Water District of Southern California, through West Basin Municipal Water District, or access to such imported water through such connection, and which normally supplies at least a part of its customers' water needs with such imported water.

4 A water year, as that term is used herein, is a twelve month period beginning October 1 and ending September 30, until it is changed to a "fiscal year," as provided in Paragraph XVI hereof.

III. Declaration of Rights - Water Rights Adjudicated.

Certain of the parties to this action have no right to extract water from the Basin. The name of each of said parties is listed below with a zero following his name, and the absence of such right in said parties is hereby established and declared. Certain of the parties to this action and/or their successors in interest (through September 30, 1978) are the owners of rights to extract water from the Basin, which rights are of the same legal force and effect and without priority with reference to each other, and the amount of such rights, stated in acre-feet per year, hereinafter referred to as "Adjudicated Rights" is listed below following such parties' names, and the rights of the last-mentioned parties are hereby declared and established accordingly. Provided, however, that the Adjudicated Rights so declared and established shall be subject to the condition that the water, when used, shall be put to beneficial use through reasonable methods of use and reasonable methods of diversion; and provided further that the exercise of all of said Rights shall be subject to a pro rata reduction, if such reduction is required, to preserve said Basin as a common source of water supply.

IV. Adjudicated Rights Transferable.

Any rights decreed and adjudicated herein may be transferred, assigned, licensed or leased by the owner thereof provided, however, that no such transfer shall be complete until compliance with the appropriate notice procedures established by the Watermaster herein.

Rights adjudicated herein which are temporarily transferred, licensed or leased shall be considered the production from the Basin on behalf of such transferee, licensee or lessee which next follows his production of released exchange pool water, if any.

V. Physical Solution - Carry-over, Excess Production and Drought Carry-over.

1 *Carry-over*. In order to add flexibility to the operation of this Judgment and to assist in a physical solution to meet the water requirements in the West Basin, each of the parties to this action who is adjudged in Paragraph III hereof to have an Adjudicated Right and who, during a water year, does not extract from the Basin all of such party's Adjudicated Right, is permitted to carry over from such water year the right to extract from the Basin in the next succeeding water year an amount of water equivalent to the excess of his Adjudicated Right over his extraction during said water year not to exceed, however, 10% of such party's Adjudicated Right or two acre-feet, whichever is the larger.

2 *Excess Production*. In order to meet possible emergencies, each of the parties to this action who is adjudged in paragraph III hereof to have an Adjudicated Right is permitted to extract from the Basin in any water year for beneficial use an amount in excess of each such party's Adjudicated Right not to exceed 2 acre-feet or ten per cent (10%) of such party's Adjudicated Rights, whichever is the larger, and in addition thereto, such greater amount as may be approved by the Court. If such greater amount is recommended by the Watermaster, such order of Court may be made *ex parte*. Each such party so extracting water in excess of his Adjudicated Rights shall be required to reduce his extractions below his Adjudicated Rights by an equivalent amount in the water year next following. Such requirement shall be subject to the proviso that in the event the Court determines that such reduction will impose upon such a party, or others relying for water service upon such party, an unreasonable hardship, the Court may grant an extension of time within which such party may be required to reduce his extractions by the amount of the excess theretofore extracted by such party. If such extension of time is recommended by the Watermaster, such order of Court may be granted *ex parte*.

3 *Drought Carry-over*. By reason of this Court's Orders dated June 2, 1977, and September 29, 1977, for the water years 1976-77 and 1977-78 any party herein (including any successor in

interest) can "carry-over" until utilized, any Adjudicated Right (including any authorized carryover rights from prior years) unexercised during said water years.

VI. Physical Solution - Exchange Pool Provisions.

As a further part of said physical solution herein imposed:

1. *Mandatory Offer to Exchange Pool*. Not less than sixty (60) days prior to the beginning of each water year, each party having supplemental water available to him through then existing facilities, other than water which any such party has the right to extract hereunder, shall file with the Watermaster the offer of such party to release to the Exchange Pool the amount by which such party's Adjudicated Right exceeds one-half of the estimated total required use of water by such party during the ensuing water year, provided that the amount required to be so offered for release shall not exceed the amount such party can replace with supplemental water so available to him.

(a) *Basis of Offer to Exchange Pool - Redetermination of Offer by Watermaster*. Such estimate of total required use and such mandatory offer shall be made in good faith and shall state the basis on which the offer is made, and shall be subject to review and redetermination by the Watermaster, who may take into consideration the prior use by such party for earlier water years and all other factors indicating the amount of such total required use and the availability of replacement water.

(b) *Voluntary Offer to Exchange Pool*. Any party filing an offer to release water under the mandatory provisions of this Paragraph VI may also file a voluntary offer to release any part or all of any remaining amount of water which such party has the right under this Judgment to pump or otherwise extract from the Basin, and any party who is not required to file an offer to release water may file a voluntary offer to release any part or all of the amount of water which such party has the right under this Judgment to pump or otherwise extract from the basin. All such voluntary offers shall be made not less than sixty (60) days prior to the beginning of each water year.

2. *Price of Water Offered to Exchange Pool*. Each offer to release water under the foregoing subparagraph [1 (a) and 1 (b)] shall be the price per acre-foot declared and determined at the time of the filing of such offer by the releasing party; provided:

(a) *Replacement Cost*. That such price per acre-foot shall not exceed the price which the releasing party would have to pay to obtain from others, in equal monthly amounts, through existing facilities, a quantity of supplemental water equal in amount to that offered to be released; *or*

(b) *Maximum Price*. If any such releasing party has no existing facilities through which to obtain water from others, such price shall not exceed the sum of the price per acre-foot charged by the Metropolitan Water District of Southern California to West Basin Municipal Water District plus the additional amount per acre-foot charged by the latter to municipalities and public utilities for water received from said Metropolitan Water District.

3. *Price Dispute -Objection - Watermaster Determination Court Determination*. In the event of a dispute as to any price at which is offered for release, any party affected thereby may, within thirty (30) days thereafter, by an objection in writing, refer the matter to the Watermaster for determination. Within thirty (30) days after such objection is filed the Watermaster shall consider said objection and shall make his finding as to the price at which said water should be offered for release and notify all interested parties thereof. Any party in compliance to these Exchange Pool Provisions may file with the Court, within thirty (30) days thereafter, any objection to such finding or determination of the Watermaster and bring the same on for hearing before the Court at such time as the Court may direct, after first having served said objection upon each of the interested parties. The Court may affirm, modify, amend or overrule such finding or determination of the Watermaster. Pending such determination if the water so offered has been allocated, the party making the offer shall be paid the price declared in his offer, subject to appropriate adjustment upon final determination. The costs of such determination shall be apportioned or assessed by the Watermaster in his discretion between or to the parties to such dispute, and the Watermaster shall have the power to require, at any time prior to making such determination, any party or parties to such dispute to deposit with the Watermaster funds sufficient to pay the cost of such determination, subject to final adjustment and review by the Court as provided in this Paragraph.

1 *Request for Water From Exchange Pool*. Not less than sixty (60) days prior to the beginning of each water year any party whose estimated required use of water during the ensuing water year exceeds the sum of the quantity of water which such party has the right under this Judgment to extract from the Basin and the quantity available to him through then existing facilities, may file with the Watermaster a request for the release of water in the amount that his said estimated use exceeds his said available supply. Such request shall be made in good faith and shall state the basis upon which the request is made, and shall be subject to review and redetermination by the Watermaster. Within thirty (30) days thereafter the Watermaster shall advise, in writing, those requesting water of the estimated price thereof. Any party desiring to amend his request by reducing the amount requested may do so after the service of such notice. Prior to the first day of each water year the Watermaster shall determine if sufficient water has been offered to satisfy all requests. If he determines that sufficient water has not been offered he shall reduce such requests pro rata in the proportion that each request bears to the total of all requests. Thereupon, not later than said first day of each water year, he shall advise all parties offering to release water of the quantities to be released by each and accepted in the Exchange Pool and the price at which such water is offered. Simultaneously, he shall advise all parties requesting water of the quantities of released water allocated from the Exchange Pool and to be taken by each requesting party and the price to be paid therefore.

2 *Allocation of Exchange Pool Water by Watermaster*. In allocating water which has been offered for release to the Exchange Pool under subparagraph 1 hereof, the Watermaster shall first allocate that water required to be offered for release and which is offered at the lowest price pursuant to subparagraph 2 hereof, and progressively thereafter at the next lowest price or prices. If the aggregate quantity of water required to be released is less than the aggregate quantity of all requests for the release of water made pursuant to subparagraph 4 hereof, he shall then allocate water voluntarily offered for release and which is offered at the lowest price and progressively thereafter at the next lowest price or prices, provided that the total allocation of water shall not exceed the aggregate of all such requests.

Any water offered for release under subparagraph 1 hereof and not accepted in the Exchange Pool and not allocated therefrom shall be deemed not to have been offered for release and may be extracted from the Basin by the party offering the same as if such offer had not been made.

Each party requesting the release of water for his use and to whom released water is allocated from the Exchange Pool may thereafter, subject to all of the provisions of this Judgment, extract such allocated amount of water from the Basin, in addition to the amount such party is otherwise entitled to extract hereunder during the water year for which the allocation is made.

1 *Exchange Pool Water Pumped Before Pumper's Own Right*. From and after the first day of each water year, all water extracted from the Basin by any party requesting the release of water and to whom such water is allocated shall be deemed to have been water so released until the full amount released for use by him shall have been taken, and no such party shall be deemed to have extracted from the Basin any water under his own right so to do until said amount of released water shall have been extracted. Water extracted from the Basin by parties pursuant to their request for the release of water shall be deemed to have been taken by the offerors of such water under their own rights to extract water from the Basin.

2 *Price and Payment for Water Released for Exchange Pool*. All parties allocated water under subparagraph 4 hereof shall pay a uniform price per acre-foot for such water, which price shall be the weighted average of the prices at which all the water allocated was offered for release.

Each party shall pay to the Watermaster, in five equal monthly installments during the applicable water year, an amount equal to the quantity of water allocated to him multiplied by said uniform price. The Watermaster shall bill each such party monthly for each such installment, the first such billing to be made on or before the first day of the second month of the water year involved, and payment therefore shall be made to the Watermaster within thirty (30) days after the service of each such statement. If such payment be not made within said thirty (30) days such payment shall be delinquent and a penalty shall be assessed thereon at the rate of 1% per month until paid. Such delinquent payment, including penalty, may be enforced against any party delinquent in payment by execution or by suit commenced by the Watermaster or by any party hereto for the benefit of the Watermaster.

Promptly upon receipt of such payment, the Watermaster shall make payment for the water released and allocated, first, to the party or parties which offered such water at the lowest price, and then through successive higher offered prices up to the total allocated.

VII. Additional Pumping Allowed Under Agreement With Central and West Basin Water Replenishment District, During Periods of Emergency.

Central and West Basin Water Replenishment District, a public corporation of the State of California, (Division 18, commencing with Section 60,000 of the Water Code), hereinafter "Replenishment District", overlies West Basin and engages in activities of replenishing the ground waters thereof.

During an actual or threatened temporary shortage of the imported water supply to West Basin, Replenishment District may, by resolution, determine to subsequently replenish the Basin for any water produced in excess of a party's adjudicated rights hereunder, within a reasonable period of time, pursuant to agreements with such parties (to a maximum of 10,000 acre feet), under the terms and conditions hereinafter set forth.

a. Notwithstanding any other provision of this Judgment, parties (including successors in interest) who are water purveyors, as herinabove defined, are authorized to enter into agreements with Replenishment District under which such water purveyors may exceed their Adjudicated Rights for a particular water year when the following conditions are met:
1. Replenishment District is in receipt of a resolution of the Board of Directors of The Metropolitan Water District of Southern California ("MWD") stating there is an actual or immediately threatened temporary shortage of MWD's imported water supply compared to MWD's needs, or a temporary inability to deliver MWD's imported water supply throughout its area, which will be alleviated in part by overpumping from West Basin.

2. The Bard of Directors of both Replenishment District and West Basin Municipal Water District (WBMWD), by resolutions, concur in the resolution of MWD's Board of Directors and each determine that the temporary overproduction in West Basin will not adversely affect the integrity of the Basin or the sea water barrier maintained along the Coast of West Basin.
3. In said resolution, Replenishment District's Board of Directors shall set a public hearing, and notice the time, place and date thereof (which may be continued from time to time without further notice) and which said notice shall be given by First Class Mail to the current designees of the parties, filed and served in accordance with Paragraph IX of this Judgment. Said notice shall be mailed at least ten (10) days before said scheduled hearing date.
4. At said public hearing, parties (including successors in interest) shall be given full opportunity to be heard, and at the conclusion thereof the Board of Directors of Replenishment District by resolution decides to proceed with agreements under this Paragraph VII.
b. All such agreements shall be subject to the following requirements, and such reasonable others as Replenishment District's Board of Directors shall require:

They shall be of uniform content except as to the quantity involved, and any special provisions considered necessary or desirable with respect to local hydrological conditions or good hydrologic practice.

They shall be offered to all water purveyors, excepting those which Replenishment District's Board of Directors determine should not over-pump because such over-pumping would occur in undesirable proximity to a sea water barrier project designed to forestall sea water intrusion, or within, or in undesirable proximity to, an area within West Basin wherein groundwater levels are at an elevation where over-pumping is, under all the circumstances, then undesirable.

The maximum terms for the agreements shall be four months, all of which said agreements shall commence and end on the same day (and which may be executed at any time within said four month period), unless an extension thereof is authorized by the Court, under this Judgment.

They shall contain provisions that the water purveyor executing the agreement pay to the Replenishment District a price, in addition to the applicable replenishment assessment, determined on the following formula: The price per acre foot of WBMWD's treated domestic and municipal water for the water year in which the agreement is to run, less the total of: (a) an amount per acre foot as an allowance on account of incremental cost of pumping, as determined by Replenishment District's Board of Directors; and (b) the rate of the replenishment assessment of Replenishment District for the same fiscal year. If the term of the agreement is for a period which will be partially in one fiscal year and partially in another, and a change in either or both the price per acre foot of WBMWD's treated domestic and municipal water and rate of the replenishment assessment of Replenishment District is scheduled, the price formula shall be determined by averaging the scheduled changes with the price and rate then in effect, based on the number of months each will be in effect during the term of the agreement. Any price for a partial acre-foot shall be computed pro rata. Payments shall be due and payable on the principle that over-extractions under the agreement are the last water pumped in the fiscal year, and shall be payable as the agreement shall provide.

They shall contain provisions that: (a) All of such agreements (but not less then all) shall be subject to termination by Replenishment District if, in the Judgment of Replenishment District's Board of Directors, the conditions or threatened conditions upon which they were based have abated to the extent over-extractions are no longer considered necessary; and (b) that any individual agreement or agreements may be terminated if the Replenishment District's Board of Directors finds that adverse hydrologic circumstances have developed as a result of over-extractions by any water purveyor or purveyors which

have executed said agreements, or for any other reason that Replenishment District's Board of Directors finds good and sufficient.

c. Other matters applicable to such agreements and over-pumping thereunder are as follows, and to the extent they would affect obligations of the Replenishment District they shall be anticipated in said agreements:

1. The quantity of over-pumping permitted shall be additional to that which the water purveyor could otherwise over-pump under this Judgment.

2. The total quantity of permitted overpumping under all said agreements during said four months shall not exceed ten thousand (10,000) acre feet, but the individual water purveyor shall not be responsible or affected by any violation of this requirement. That total is additional to over-extractions otherwise permitted under this Judgment.

3. Only one four month period may be utilized by Replenishment District in entering into such agreements, as to any one emergency or continuation thereof declared by MWD's Board of Directors under sub-paragraph 6 (a) hereof.

4. The *ex parte* provisions of this Judgment may be utilized in lieu of the authority contained herein (which *ex parte* provisions are not limited as to time, nature or relief, or terms of any agreements), but neither Replenishment District nor any other party shall utilize both as to any one such emergency or continuation thereof.

5. If any party claims that it is being damaged or threatened with damage by the over-extractions by any party to such an agreement, the Watermaster or any party hereto may seek appropriate action of the Court for termination of any such agreement upon notice of hearing given by the party complaining, to the party to said agreement, to the Replenishment District, and to all parties who have filed a request herein for such special notice. Any such termination shall not affect the obligation of the terminated party to make payments under the agreement for over-extractions which previously occurred thereunder.
6. Replenishment District shall maintain separate accounting and a separate fund of the proceeds from payments made pursuant to agreements entered into under this Paragraph
VII. Said fund shall be utilized solely for purposes of replenishment and the replacement of waters in West Basin. Replenishment District shall, as soon as practicable, cause replenishment in West Basin by the amounts to be overproduced pursuant to this Paragraph VII, whether through spreading, injection, or in-lieu agreements.
7. Over-extractions made pursuant to the said agreements shall not be subject to the "make up" provisions of this Judgment, as amended, provided, that if any party fails to make payments as required by the agreement, Watermaster may require such "make up" under Paragraph V hereof.

8. Water Purveyor under any such agreement may, and is encouraged to, enter into appropriate arrangements with customers who have water rights in West Basin under or pursuant to this Judgment, whereby the Water Purveyor will be assisted in meeting the objectives of the agreement.

9. Nothing in this Paragraph VII limits the exercise of the reserved and continuing jurisdiction of the court as provided in Paragraph XIV hereof.

VIII. Injunction.

On and after the date hereof, each of the parties hereto, their successors and assigns, and each of their agents, employees, attorneys, and any and all persons acting by, through, or under them or any of them, are and each of them is hereby perpetually enjoined and restrained from pumping or otherwise extracting from the Basin any water in excess of said party's Adjudicated Rights, except as provided in Paragraphs V, VI, and VII hereof.

IX. Order of Pumping Credit.

Production of water from the Basin for the use or benefit of the parties hereto shall be credited to each such party in the following order:

1. Exchange Pool production (Paragraph VI).
2. Leased or licensed production (Paragraph IV).
3. Normal carry-over (Paragraph V, 1).
4. Adjudicated Right (Paragraph III).
5. Drought carry-over (Paragraph V, 3).
6. Emergency Production under Agreement with Replenishment District (Paragraph VII).

X. Loss of Decreed Rights.

It is in the best interests of the parties herein and the reasonable beneficial use of the Basin and its water supply that no party be encouraged to take and use more water than is actually required. Failure to produce all of the water to which a party is entitled hereunder shall not, in and of itself, be deemed or constitute an abandonment of such party's right in whole or in part.

No taking of water under Paragraphs III, V, VI and VII hereof, by any party to this action shall constitute a taking adverse to any other party; nor shall any party to this action have the right to plead the statute of limitations or an estoppel against any other party by reason of his said extracting of water from the Basin pursuant to a request for the release of water; nor shall such release of water to the Exchange Pool by any party constitute a forfeiture or abandonment by such party of any part of his Adjudicated Right to water; nor shall such release in anywise constitute a waiver of such right although such water, when released under the terms of this Judgment may be devoted to a public use; nor shall such release of water by any such party in anywise obligate any party so releasing to continue to release or furnish water to any other party or his successor in interest, or to the public generally, or to any party thereof, otherwise than as provided herein.

XI. Watermaster Appointment.

The Watermaster shall be the Department of Water Resources of the Resources Agency of the State of California, to serve at the pleasure of the Court, and said Watermaster shall administer and enforce the provisions of this Judgment and the instructions and subsequent orders of this Court, and shall have the powers and duties hereinafter set forth. If any such provisions, instructions or orders of the Court shall have been disobeyed or disregarded, said Watermaster is hereby empowered and directed to report to the Court such fact and the circumstances connected therewith and leading thereto.

XII. Watermaster - Powers and Duties.

In order to assist the Court in the administration and enforcement of the provisions of this Judgment and to keep the Court fully advised in the premises, the Watermaster shall have the following duties in addition to those provided for elsewhere herein:

1. *Parties to Measure and Record Static Water Level of Each Well*. The Watermaster may require each party, at such party's own expense, to measure and record not more often than once a month, the elevation of the static water level in such of his wells in the Basin as are specified by the Watermaster.

2. *Parties to Install Meters on Wells and Record Production Therefrom*. The Watermaster may require any party hereto owning any facilities for pumping or otherwise extracting water from the Basin, at such party's own expense, to install and at all times maintain in good working order, mechanical measuring devices, approved by the Watermaster, and keep records of water production, as required by the Watermaster, through the use of such devices. However, if in the opinion of the Watermaster such mechanical devices are not practicable or feasible, the Watermaster may require such party to submit estimates of his water production, together with such information and data as is used by such party in making such estimate. Upon the failure of any party to install such device or devices on or before the date the Watermaster shall fix for such installation, or to provide the Watermaster with estimates of water production and information on which such estimates are based, the Watermaster may give the Court and the party notice of such failure for proper action in the premises.

3. *Watermaster to Assemble Records and Data and Evaluate Same*. The Watermaster shall collect and assemble the records and other data required of the parties hereto, and evaluate such records and other data. Such records and other data shall be open to inspection by any party hereto or his representative during normal business hours.

4. *Watermaster's Annual Budget*. The Watermaster shall prepare a tentative budget for each water year, stating the estimated expense for administering the provisions of this Judgment. The Watermaster shall mail a copy of said tentative budget to the designee of each of the parties hereto having an Adjudicated Right, at least sixty (60) days before the beginning of each water year. If any such party has any objection to said tentative budget or any suggestions with respect thereto, he shall present the same in writing to the Watermaster within fifteen (15) days after service of said tentative budget upon him. If no objections are received, the tentative budget shall become the final budget. If objections to said tentative budget are received, the Watermaster shall, within then (10) days thereafter, consider such objections, prepare a final budget, and mail a copy thereof to each such party's designee, together with a statement of the amount assessed to each such party, computed as provided in subparagraph 5 of this Paragraph XII. Any such party whose objections to said tentative budget are denied in whole or in part by the Watermaster may, within fifteen (15) days after the service of the final budget upon him, make written objection thereto by filing his objection with the Court after first mailing a copy of such objection to each party's designee, and shall bring such objection on for hearing before the Court at such time as the Court may direct. If objection to such budget be filed with the Court as herein provided, then the said budget and any and all assessments made as herein provided may be adjusted by the Court following said hearing.

5. *Watermaster's Fees as Parties' Costs*. The fees compensation or other expenses of the Watermaster hereunder shall be borne by the parties hereto having Adjudicated Rights in the proportion that each such party's Adjudicated Right bears to the total Adjudicated Rights of all such parties, and the Court or Watermaster shall assess such costs to each such party accordingly.

Payment thereof, whether or not subject to adjustment by the Court as provided in this Paragraph XII, shall be made by each such party, on or prior to the beginning of the water year to which said final budget and statement of assessed costs is applicable. If such payment by any party is not made on or before said date, the Watermaster shall add a penalty of 5% thereof to such party's statement. Payment required of any party hereunder may be enforced by execution issued out of the Court, or as may be provided by any order hereinafter made by the Court, or by other proceedings by the Watermaster or by any party hereto on the Watermaster's behalf.

All such payments and penalties received by the Watermaster shall be expended by him for the administration of this Judgment. Any money remaining at the end of any water year shall be available for such use in the following water year.

1 *Watermaster's Annual Report*. The Watermaster shall prepare an annual report within ninety (90) days after the end of each water year covering the work of the Watermaster during the preceding water year and a statement of his receipts and expenditures.

2 *Watermaster Report to Contain All Basin Production*. The Watermaster shall report separately, in said annual report, all water extractions in the Basin, including that by producers who have no "Adjudicated Right."

3 *Watermaster Rules and Regulations*. The Watermaster may prescribe such reasonable Rules and Regulations as will assist him in the performance of his duties hereunder.

4 *Other Watermaster Duties*. The Watermaster shall perform such other duties as directed by the Court and as may be otherwise provided by law.

XIII. Objection to Watermaster Determination - Notice Thereof and Hearing Thereon.

Any party hereto having an Adjudicated Right who has objection to any determination or finding made by the Watermaster, other than as provided in Paragraphs VI and XII hereof, may make such objection in writing to the Watermaster within thirty (30) days after the date the Watermaster gives written notice of the making of such determination or finding, and within thirty (30) days thereafter the Watermaster shall consider said objection and shall amend or affirm such finding or determination and shall give notice thereof to all parties hereto having Adjudicated Rights. Any such party may file with the Court within thirty (30) days from the date of said notice any objection to such final finding or determination of the Watermaster and bring the same on for hearing before the Court at such time as the Court may direct, after first having served said objection upon each of the parties hereto having an Adjudicated Right. The Court may affirm, modify, amend or overrule any such finding or determination of the Watermaster.

XIV. Reserved and Continuing Jurisdiction of Court.

The Court hereby reserves continuing jurisdiction and, upon application of any party hereto having an Adjudicated Right or upon its own motion, may review (1) its determination of the safe yield of the Basin, or (2) the Adjudicated Rights, in the aggregate, of all of the parties as affected by the abandonment or forfeiture of any such rights, in whole or in part, and by the abandonment or forfeiture of any such rights by any other person or entity, and, in the event material change be found, to adjudge that the Adjudicated Right of each party shall be ratably changed; provided, however, that notice of such review shall be served on all parties hereto having Adjudicated Rights at least thirty (30) days prior thereto. Except as provided herein, and except as rights decreed herein may be abandoned or forfeited in whole or in part, each and every right decreed herein shall be fixed as of the date of the entry hereof.

XV. Judgment Modifications and Further Orders of Court.

The Court further reserves jurisdiction so that at any time, and from time to time, upon its own motion or upon application of any party hereto having an Adjudicated Right, and upon at least thirty (30) days notice to all such parties, to make such modifications of or such additions to, the provisions of this Judgment, or make such further order or orders as may be necessary or desirable for the adequate enforcement, protection or preservation of the Basin and of the rights of the parties as herein determined.

XVI. Subsequent Change From Water Year to Fiscal Year.

"Water year" as used in Paragraphs V,VI,VII and XII hereof shall, beginning with the first "fiscal year" (July 1 - June 30) commencing at least four months after this "Amended Judgment" becomes final, and thereafter, mean the "fiscal year". Since this changeover will provide a transitional accounting period of nine months, October 1 - June 30, notwithstanding the findings and determinations in the annual Watermaster Report for the last preceding water year, the Adjudicated Right of each of the parties hereto permitted to be extracted from the West Basin for said transitional accounting period shall be on the basis of three-quarters of each said party's otherwise Adjudicated Right. The Watermaster herein shall convert the times of his duties hereunder, including the rendition of a nine month report for the said transitional accounting period (October 1 - June 30), to coincide with the changeover from the water year to the fiscal year hereunder.

XVII. Designees of Parties for Future Notice and Service.

Service of this "Amended Judgment" on those parties who have executed and filed with the Court "Agreement and Stipulation for Judgment" or otherwise have named a designee, filed the same herein and have therein designated a person thereafter to receive notices, requests, demands, objections, reports, and all other papers and processes in this cause, shall be made by first class mail, postage prepaid, addressed to such designees (or their successors) and at the address designated for that purpose.

Each party who has not heretofore made such a designation shall, within thirty (30) days after the Amended Judgment herein shall have been served upon that party or his designee, file with the Court, with proof of service of a copy thereof upon the Watermaster, a written designation of the person to whom and the address at which all future notices, determinations, requests, demands, objections, reports and other papers and processes to be served upon that party or delivered to that party, are to be so served or delivered.

A later substitute or successor designation filed and served in the same manner by any party shall be effective from the date of such filing as to the then future notices, determinations, requests, demands, objections, reports and other papers and processes to be served upon or delivered to that party.

Delivery to or service upon any party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to a party under or pursuant to this Judgment, may be by deposit in the mail, first class, postage prepaid, addressed to the latest designee and at the address in said latest designation filed by that party.

Parties hereto who have not entered their appearance or whose default has been entered and who are adjudged herein to have an Adjudicated Right, and who have not named a designee for service herein, shall be served with all said future notices, papers and process herein, and service herein shall be accomplished, by publication of a copy of such said notice, paper or process addressed to, "Parties to the West Basin Adjudication"; said publication shall be made once each week for two successive weeks in a newspaper of general circulation, printed and published in the County of Los Angeles, State of California, and circulated within the West Basin Area; the last publication of which shall be at least two weeks and not more than five weeks immediately preceding the event for which said notice is given or immediately preceding the effective date of any order, paper or process; in the event an effective date other than the date of its execution is fixed by the Court in respect of any order, paper or process, said last publication shall be made not more than five weeks following an event, the entry of an order by the Court, or date of any paper or process with respect to which such notice is given.

XVIII. Intervention of Successors In Interest and New Parties.

Any person who is not a party herein or successor to such party and who proposes to produce water from the Basin may seek to become a party to this Judgment, through a Stipulation In Intervention entered into with the Watermaster. Watermaster may execute said Stipulation on behalf of the other parties herein, but such Stipulation shall not preclude a party from opposing such intervention at the time of the court hearing thereon. Said Stipulation for Intervention must thereupon be filed with the Court, which will consider an order confirming said intervention following thirty (30) days notice thereof to the parties, served as herein provided. Thereafter, if approved by the Court, such Intervenors shall be a party herein, bound by this Judgment and entitled to the rights and privileges accorded under the physical solution imposed herein.

XIX. Judgment Binding on Successors.

Subject to the specific provisions hereinbefore contained, this Judgment and all provisions thereof are applicable to, binding upon and inure to the benefit of not only the parties to this action, but as well to their respective heirs, executors, administrators, successors, assigns, lessees, licensees and to the agents, employees and attorneys-in-fact of any such persons.

XX. Effect of Amended Judgment on Orders Heretofore Made and Entered Herein.

This Amended Judgment shall not abrogate the rights of any additional carry-over of unused Adjudicated Rights of the parties herein, as may exist pursuant to the orders herein filed June 2, 1977, and September 29, 1977.

ORDER AMENDING JUDGMENT
(Filed with County Clerk on March 8, 1989)

GOOD CAUSE APPEARING upon the duly-noticed Motion of West Basin Municipal Water District:

IT IS HEREBY ORDERED THAT THE JUDGMENT HEREIN BE AMENDED AS FOLLOWS:

"NON-CONSUMPTIVE PRACTICES

1. Any party herein may petition the Watermaster for a non-consumptive water use permit as part of a project to recover old refined oil or other pollutants that has leaked into the underground aquifers of the Basin. If the petition is granted as set forth in this part, the petitioner may extract the groundwater covered by the petition without the production counting against the petitioner's production rights.
2. If the Watermaster determines that there is a problem of groundwater contamination which the proposed project will remedy or ameliorate, an operator may make extractions of groundwater to remedy or ameliorate that problem if the water is not applied to beneficial surface use, its extractions are made in compliance with terms and conditions established by the Watermaster, and the Watermaster has determined either of the following:

a. The groundwater to be extracted is unusable and cannot be economically blended for use with other water.
b. The proposed program involves extraction of usable water in the same quantity as will be returned to the underground without degradation of quality.

3. The Watermaster may provide those terms and conditions the Watermaster deems appropriate, including, but not limited to, restrictions on the quantity of extractions to be so exempted, limitations on time, periodic reviews, requirement of submission of test results from a Watermaster-approved laboratory, and any other relevant terms or conditions.

4. The Watermaster shall conduct a public hearing on the petition and all parties herein and their representatives shall have an opportunity to be heard concerning the same.

5. The Watermaster shall, in its discretion, grant or deny the petition and fix a reasonable annual administrative fee to be paid to the Watermaster by the permittee. Within fifteen (15) days after the rendition of its decision, the Watermaster shall give written notice thereof to the designees of all parties herein.

6. After a noticed, public hearing, the Watermaster may, on the motion of any party herein or on its own motion, interrupt or stop a project for non-compliance with the terms of its permit or rescind or modify the terms of a permit to protect the integrity of the Basin of the Judgment herein. An order to interrupt or stop a project or to rescind or modify the terms of a permit shall apply to groundwater extractions occurring more than 10 days after the date of the order. The permit holder and the designees of all parties herein shall be given two weeks written notice of any hearing to consider interrupting or stopping a permitted project or the rescission or modification of the terms of a permit. Notice will be deemed given when mailed by first-class mail or when personally delivered.

7. The Watermaster's decision to grant, deny, modify or revoke a permit or to interrupt or stop a permitted project may be appealed to this court within thirty (30) days of the notice thereof and upon thirty (30) days notice to the designees of all parties herein.

8. The Watermaster shall monitor and periodically inspect the project for compliance with the terms and conditions of the permit hereunder.

9. No party shall recover costs from any other party herein."

IT IS FURTHER ORDERED that the amendment to the judgment approved by the court on March 22, 1984 ("former amendment") is hereby repealed, provided, all permits issued by the Watermaster under the former amendment shall be deemed under the instant amendment.

Appendix G: City Ordinance 3717: Water Conservation Plan

City of Torrance 2010 Urban Water Management Plan

CONSERVATION ORDINANCE #3717
(Replaced 1991 Ordinance)

Council Meeting of
July 21, 2009

Honorable Mayor and Members
of the City Council
City Hall
Torrance, California

Members of the Council:

SUBJECT: Public Works – Approve a RESOLUTION authorizing activation of a Level 1 Water Supply Shortage Condition in accordance the City's Water Conservation Ordinance 3717 and authorize the implementation of an enhanced conservation program to reduce potable (drinking) water consumption by 10%. Expenditure: None

RECOMMENDATION

Recommendation of the Water Commission and the Public Works Director that the City Council approve a **RESOLUTION** authorizing activation of a Level 1 Water Supply Shortage Condition in accordance with Section 76.4.070 of the City's Water Conservation Ordinance 3717 to declare an urgent water shortage condition and requires that all municipal customers reduce their water consumption by 10%. The activation of the Level 1 shortage condition would increase mandatory measures by limiting outdoor watering to three days per week, prohibit outdoor watering from 9 a.m. until 5 p.m., and require that all water leaks be repaired within seven days.

Funding

There is no additional funding required at this time.

BACKGROUND AND ANALYSIS

The City Council adopted an updated Water Conservation Ordinance (Ordinance Number 3717) on March 24, 2009 to replace an existing Ordinance in place since 1991. The new Ordinance sets forth various water use regulations and restrictions, along with establishing financial penalties for repeated violators who do not comply with water waste prohibitions. The focus of the Ordinance is the elimination of wasteful use of potable (drinking) water supplies. The Ordinance prohibits various wasteful water practices such as excessive watering of landscapes, irrigating landscapes in the late morning and afternoon, washing down exterior hard surfaces and other related inappropriate water use practices. Elimination of wasteful water practices has the potential to cut water use in the region by approximately 10%

A Level 1 Water Supply condition is activated when MWD calls for extraordinary water conservation of up to 15%. Since MWD has declared mandatory reductions in imported water deliveries to all of its member agencies, it is appropriate to activate the Level 1 stage of the City's Conservation Ordinance, in accordance with Section 75.4.070 of the Ordinance. In addition to the permanent measures already in place, the Level 1 stage would: prohibit outdoor watering between the hours of 9 a.m. and 5 p.m.; limit outdoor watering to three days per week; and require all water leaks to be fixed within seven days.

In lieu of penalty rates, it is proposed that TMW implement an enhanced conservation program calling for an additional 10% reduction in potable water use. The conservation program

12D

will be supported by an accelerated community outreach program. Although overuse penalties would not be imposed at this time, municipal customers will have conservation targets posted on their bills. The program will be monitored closely for compliance in meeting prescribed conservation targets. Penalty rates will be considered if the program falls short of our conservation target.

The Water Commission considered this matter at their regular meeting on July 16, 2009. Upon hearing proposals and recommendations from staff and the Commission's Conservation Committee, the Water Commission supported the activation of the Level 1 stage of the Water Conservation Ordinance and the implementation of an enhanced conservation program.

The activation of Level 1 stage of the Water Conservation Ordinance and the implementation of the enhanced conservation program will help foster a new water ethic and improve the City's water supply reliability.

Respectfully submitted,

WATER COMMISSION

Alex See, Chair

ROBERT J. BESTE
Public Works Director

By Charles J. Schaich
Senior Administrative Analyst

CONCUR:

Jack van der Linden
Deputy Public Works Director

Robert J, Beste
Public Works Director

NOTED:

LeRoy J. Jackson
City Manager

Attachments: A. Resolution
B. Conservation Ordinance 3717

RESOLUTION NO. 2009 –

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TORRANCE DECLARING A LEVEL 1 WATER SUPPLY SHORTAGE CONDITION IN ACCORDANCE WITH SECTIONS 76.4.070 AND 76.4.100 OF THE TORRANCE MUNICIPAL CODE

WHEREAS, On March 24, 2009, the City of Council of the City of Torrance adopted Ordinance No. 3717, which was entitled "An Ordinance of the City Council of the City of Torrance Establishing a Water Conservation and Water Supply Shortage and Sustainability Program and Regulations" (Water Conservation Ordinance); and

WHEREAS, The Water Conservation Ordinance establishes certain permanent prohibitions regarding the wasteful uses of water and establishes increased levels of conservation depending on the severity of the drought or other water supply reductions; and

WHEREAS, Torrance Municipal Code section 76.4.070 provides for the declaration of a Level 1 Water Supply Shortage condition in the event that the Metropolitan Water District of Southern California (MWD) calls for extraordinary water conservation and declares up to a 15% mandatory cutback in imported MWD deliveries to its member agencies; and

WHEREAS, Torrance Municipal Code section 76.4.100 provides that the existence of a Level 1 Water Supply Shortage condition may be declared by resolution of the City Council and that the mandatory conservation requirements applicable to a Level 1 Water Supply Shortage condition will take effect immediately upon adoption by the City Council; and

WHEREAS, The State of California is the midst of a third consecutive drought year and the Metropolitan Water District has declared mandatory reductions in MWD imported water supplies to its member agencies; and

WHEREAS, The declaration of Level 1 Water Supply Shortage condition helps mitigate the impacts of the water shortage situation by implementing augmented water use restrictions in addition to current permanent measures including: prohibiting outdoor watering between the hours of 9 a.m. and 5 p.m.; limiting outdoor watering to three days per week; and requiring all water leaks and breaks be repaired within seven days; and

WHEREAS, The current water situation is highly uncertain and it is necessary that an enhanced voluntary conservation program calling for an additional 10% reduction in potable (drinking) water use be implemented concurrently with

the declaration of the Level 1 Water Supply Shortage condition of the Water Conservation Ordinance.

NOW THEREFORE, BE IT RESOLVED, that the City Council of the City of Torrance hereby declares the Level 1 Water Supply Shortage condition of the Water Conservation Ordinance and authorizes the implementation of an enhanced voluntary conservation program calling for an additional 10% reduction in potable water use.

INTRODUCED, APPROVED AND ADOPTED this _____day of_____, 2009.

_____
Frank Scotto
Mayor of the City of Torrance

ATTEST:

_____
Sue Herbers
City Clerk of the City of Torrance

APPROVED AS TO FORM

JOHN L.FELLOWS III
City Attorney

By _____
RONALD T. POHL
Assistant City Attorney

ORDINANCE NO. 3717

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF TORRANCE ESTABLISHING A WATER CONSERVATION AND WATER SUPPLY SHORTAGE AND SUSTAINABILITY PROGRAM AND REGULATIONS

The City Council of the City of Torrance ordains as follows:

SECTION 1
Article 4 of Chapter 6 of Division 7 of the Torrance Municipal Code is repealed.

SECTION 2
A new Article 4 of Chapter 6 of Division 7 of the Torrance Municipal Code is added to read in its entirety as follows:

"Section 76.4.010 Title.
This Article will be known as the City of Torrance Water Conservation and Water Supply Shortage and Sustainability Program.

Section 76.4.020 Findings.

a) A reliable minimum and sustainable supply of Potable Water is essential to the public health, safety and welfare of the people and economy of the City of Torrance and the southern California region.

b) Southern California is a semi-arid region and is largely dependent upon imported water supplies. A growing population, climate change, environmental concerns, and other factors in other parts of the State and western United States, make the region highly susceptible to water supply reliability issues.

c) Careful water management that includes active water Conservation measures not only in times of drought, but at all times, is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.

d) Article XI, Section 7 of the California Constitution declares that a city or county may make and enforce within its limits all local, police, sanitary and other ordinances and regulations not in conflict with general laws.

e) Article X, Section 2 of the California Constitution declares that the general welfare requires that water resources be put to beneficial use, waste or unreasonable use or unreasonable method of use of water be prevented, and Conservation of water be fully exercised with a view to the reasonable and beneficial use thereof.

f) California Water Code section 375 authorizes water suppliers to adopt and enforce a comprehensive water Conservation program to reduce water consumption and conserve supplies.

g) The adoption and enforcement of a Water Conservation and Supply Shortage and Sustainability program is necessary to manage the City's Potable Water supply in the short and long-term and to avoid or minimize the effects of drought and shortage within the City. Such program is essential to ensure a reliable and sustainable minimum supply of water for the public health, safety and welfare for current and future generations.

Section 76.4.030. Declaration of Purpose and Intent.

a) The purpose of this Article is to establish a Water Conservation and Supply Shortage and Sustainability program that will reduce water consumption within the City through Conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within the City to avoid and minimize the effect and hardship of water shortage to the greatest extent possible.

b) This Article establishes permanent water Conservation standards intended to alter behavior related to water use efficiency for non-shortage conditions and further establishes three levels of water supply shortage response actions to be implemented during times of declared water shortage or declared water shortage emergency, with increasing restrictions on water use in response to worsening drought or emergency conditions and decreasing supplies

Section 76.4.040. Definitions.

a) The following words and phrases whenever used in this Article have the meaning defined in this section:

1) **"Allocation"** means a form of water rationing that uses penalty pricing to achieve target reductions in water use.

2) **"Billing Unit"** means the unit of water used to apply water rates for purposes of calculating water charges for a Person's water usage and equals 100 cubic feet or 748 gallons of water.

3) **"City"** means the City of Torrance.

4) **"Conservation"** means the practice of protecting against the loss or waste of natural resources.

5) **"Customer" or "Water User"** means a Person that uses Potable Water through a metered service connection.

6) **"Landscape Irrigation System"** means an irrigation system with pipes, hoses, spray heads, or sprinkling devices that are operated by hand or through an automated system.

7) **"Large Landscape Areas"** means a lawn, landscape, or other vegetated area, or combination thereof, equal to more than one (1) acre of irrigable land.

8) **"Person"** means any natural person or persons, corporation, public or private entity, governmental agency or institution, or any other user of water within the City.

9) **"Potable Water"** means water which is suitable for drinking.

10) **"Recycled Water"** means the reclamation and reuse of non-Potable Water for beneficial use.

11) **"Single Pass Cooling Systems"** means equipment where water is circulated only once to cool equipment before being disposed.

12) **"Sustainability"** means a decision making concept describing water use that meets present needs without compromising the ability to meet future requirements.

Section 76.4.050. Application

a) The provisions of this Article apply to any Person in the use of any Potable Water provided by the City.

b) The provisions of this Article do not apply to uses of water necessary to protect public health and safety or for essential government services, such as police, fire and other similar emergency services.

c) The provisions of this Article do not apply to the use of Recycled Water.

d) The provisions of this Article do not apply to the use of water by commercial nurseries and commercial growers to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale.

e) This Article is intended solely to further the Conservation of water. It is not intended to implement any provision of federal, State, or local statutes, ordinances, or regulations relating to protection of water quality or control of drainage or runoff.

Section 76.4.060 Permanent Water Conservation Requirements – Prohibition Against Waste
The following water Conservation requirements are effective at all times and are permanent, unless rescinded by the action of the City Council. Violations of this section will be considered waste and an unreasonable use of water.

a) **Limits on Watering Hours**: Watering or irrigating of lawn, landscape or other vegetated area with Potable Water is prohibited between the hours of 10 a.m. and 4 p.m. on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

b) **Limit on Watering Duration**: Watering or irrigating of lawn, landscape or other vegetated area with Potable Water using a Landscape Irrigation System or a watering device that is not continuously attended is limited to no more than 15 minutes watering per day per station. This subsection does not apply to Landscape Irrigation Systems that exclusively use very low-flow drip type irrigation systems when no emitter produces more than 2 gallons of water per hour and weather based controllers or stream rotor sprinklers that meet a 70% efficiency standard.

c) **No Excessive Water Flow or Runoff:** Watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter or ditch is prohibited.

d) **No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device or a low-volume, high-pressure water efficient water broom (Watermiser or equivalent brand) type or cleaning machine equipped to recycle any water used.

e) **Obligation to Fix Leaks, Breaks or Malfunctions:** Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the Water User's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than 15 days of receiving notice from the City, is prohibited.

f) **Re-circulating Water Required for Water Fountains and Decorative Water Features**: Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited. This provision will be effective 90 days after adoption of this Ordinance.

g) **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device. This subsection does not apply to any commercial car washing facility.

h) **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, club or other public place where food or drinks are sold, served, or offered for sale, are prohibited from providing drinking water to any Person unless expressly requested.

i) **Commercial Lodging Establishments Must Provide Option to Not Launder Linen Daily:** Hotels, motels and other commercial lodging establishments must provide Customers the option of not having towels and linen laundered daily. Commercial lodging establishments must prominently display notice of this option in each bathroom using clear and easily understood language.

j) **No Installation of Single Pass Cooling Systems:** Installation of Single Pass Cooling Systems is prohibited in buildings requesting new water service.

k) **No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.

l) **Restaurants Required to Use Water Conserving Dish Wash Spray Valves:** Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.

Section 76.4.070 Level 1 Water Supply Shortage

a) A Level 1 Water Supply Shortage exists when the City determines, in its sole discretion, that due to drought or other water supply reductions, a water supply shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration by the City of a Level 1 Water Supply Shortage condition, the City will implement the mandatory Level 1 Conservation measures identified in this section. The type of event that may prompt the City to declare a Level 1 Water Supply Shortage may include, among other factors, a finding that the Metropolitan Water District of Southern California ("MWD") calls for extraordinary water Conservation and declares up to a 15% mandatory Allocation (rationing) within the MWD service area.

A Level 1 Water Supply Shortage condition exists when the City notifies its Water Users that due to drought or other supply reductions, a Customer demand reduction of up to 15% is necessary to make more efficient use of water and respond to existing water shortage conditions. Upon the declaration of a Level 1 Water Supply Shortage condition, the City shall implement the mandatory Level 1 Conservation measures identified in this ordinance.

b) **Additional Water Conservation Measures:** In addition to the prohibited uses of water identified in Section 76.4.060, the following water Conservation requirements apply during a declared Level 1 Water Supply Shortage:

1) **Limits on Watering Hours and Watering Duration:** Watering or irrigating of lawn, landscape or other vegetated area with Potable Water is prohibited between the hours of 9 a.m. and 5 p.m. on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system. Watering or irrigating of lawn, landscape or other vegetated area with Potable Water using a Landscape Irrigation System is limited to no more than 15 minutes watering per day.

2) **Limits on Watering Days:** Watering or irrigating of lawn, landscape or other vegetated area with Potable Water is limited to 3 days per week on a schedule established and posted by the City. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than 2 gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

3) **Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the Water User's plumbing or distribution system must be repaired within 7 days of notification by the City unless other arrangements are made with the City.

4) **Other Prohibited Uses:** The City may implement other prohibited water uses as determined by the City, after notice to Customers.

Section 76.4.080 Level 2 Water Supply Shortage

a) A Level 2 Water Supply Shortage exists when the City determines, in its sole discretion, that due to drought or other supply reductions, a water supply shortage exists and a consumer demand reduction is necessary to make more efficient use of water and respond to existing water conditions. Upon the declaration by the City of a Level 2 Water Supply Shortage condition, the City will implement the mandatory Level 2 Conservation measures identified in this section.

A Level 2 Water Supply Shortage condition exists when the City notifies its Water Users that due to drought or other supply reductions, a Customer demand reduction exceeding 15 % to up to 30% is necessary to make more efficient use of water and respond to existing water shortage conditions. Upon the declaration of a Level 2 Water Supply Shortage condition, the City shall implement the mandatory Level 2 Conservation measures identified in this ordinance.

b) **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Section 76.4.060 and 76.4.070, the following additional water Conservation requirements apply during a declared Level 2 Water Supply Shortage:

1) **Limits on Watering Hours and Watering Duration** Watering or irrigating of lawn, landscape or other vegetated area with Potable Water is prohibited between the hours of 8 a.m. and 6 p.m. on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for a very short periods of time for the express purpose of adjusting or repairing an irrigation system. Watering or irrigating of lawn, landscape or other vegetates area with Potable Water using a Landscape Irrigation System is limited to no more than 10 minutes per day.

2) **Watering Days:** Watering or irrigating of lawn, landscape or other vegetated area with Potable Water is limited to 2 days per week on a schedule established and posted by the City. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than 2 gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

3) **Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the Water User's plumbing or distribution system must be repaired within four days of notification by the City unless other arrangements are made with the City.

4) **Limits on Filling Ornamental Lakes or Ponds**: Filling or re-filling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a supply shortage level under this ordinance.

5) **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to, any automobile, truck, van, bus motorcycle, boat or trailer, whether motorized or not, is prohibited except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, by high pressure/low volume wash systems, or at a commercial car washing facility that utilizes a re-circulating water system to capture or reuse water.

6) **Limits on Filling Residential Swimming Pools & Spas:** Re-filling of more than one foot and initial filling of residential swimming pools or outdoor spas with Potable Water is prohibited.

7) **Other Prohibited Uses:** The City may implement other prohibitions on water uses as determined by the City, after notice to Customers.

Section 76.4.090 Level 3 Water Supply Shortage – Emergency Condition

a) A Level 3 Water Supply Shortage condition is also referred to as an "Emergency" condition. A Level 3 condition exists when the City declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to make more efficient use of water and respond to existing water conditions. Upon the declaration of a Level 3 Water Supply Shortage Emergency condition, the City will implement the mandatory Level 3 Conservation measures identified in this section.

A Level 3 Water Supply Shortage condition exists when the City notifies its Water Users that due to drought or other supply reductions, a Customer demand reduction exceeding 30% is necessary to make more efficient use of water and respond to existing water shortage conditions. Upon declaration of a Level 3 Water Supply Shortage condition, the City shall implement the mandatory Level 3 Conservation measures identified in this ordinance.

b) **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Section 76.4.060, 76.4.070, and 76.4.080, the following water Conservation requirements apply during a declared Level 3 Water Supply Shortage Emergency:

1) **No Watering or Irrigating:** Watering or irrigating of lawn, landscape or other vegetated area with Potable Water is prohibited. This restriction does not apply to the following categories of use or to the use of Recycled Water providing it is available and may be lawfully applied to the use:

i) Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self–closing water shut-off nozzle or device, or a very low-flow drip type irrigation system when no emitter produces more than 2 gallons of water per hour subject to the hour restrictions in Section 76.4.060 (a);

ii) Maintenance of existing landscape necessary for fire protection;

iii) Maintenance of existing landscape for soil erosion control;

iv) Maintenance of plant materials identified to be rare or essential to the well being of rare animals;

v) Maintenance of landscape within active public parks and playing fields, day care centers, school grounds, cemeteries, and golf course greens, provided that such irrigation does not exceed 2 days per week according to the schedule established in Section 76.4.080 (b)(1) and time restrictions in Section 76.4.060 (a) and (b);

vi) Public works projects and actively irrigated environmental mitigation projects.

2) **Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the Water User's plumbing or distribution system must be repaired within two days of notification by the City unless other arrangements are made with the City.

3) **Discontinue Service**: The City, in its sole discretion, may discontinue service to Customers who willfully violate provisions of this section.

4) **Other Prohibited Uses:** The City may implement other prohibited water uses as determined by the City, after notice to Customers.

Section 76.4.100 Procedures for Determination / Notification of Water Supply Shortage

a) **Declaration and Notification of Level 1 & 2 Water Supply Shortage:**

1) The existence of Level 1, Level 2, and Level 3 Water Supply Shortage conditions may be declared by resolution of the City adopted at a regular or special public meeting held in accordance with State law. The mandatory Conservation requirements applicable to Level 1, Level 2 and Level 3 Water Supply Shortage conditions will take effect immediately upon adoption by the City Council.

2) In case of emergency, the City Manager will have the authority to declare a Level 1, Level 2, and Level 3 Water Supply Shortage condition subject to ratification by the City Council within 7 days or the order will have no further force or effect.

3) The City Council is authorized to implement mandatory Conservation requirements applicable to Level 1, Level 2 and Level 3 Water Supply Shortage conditions in order for the City to comply with water use restrictions imposed by federal, state or regional water agencies or respond to emergency water shortage conditions.

Section 76.4.110 Other Provisions

a) **Commercial Car Wash Systems**: Effective on January 1, 2012, all commercial conveyor car wash systems must have installed and operational re-circulating water systems, or must have secured a waiver of this requirement from the City.

b) **Large Landscape Areas – Rain Sensors**: Effective January 1, 2012, Large Landscape Areas, such as parks, cemeteries, golf courses, school grounds, and playing fields, that use Landscape Irrigation Systems to water or irrigate, must use Landscape Irrigation Systems with rain sensors that automatically shut off such systems during periods of rain or irrigation timers which automatically use information such as evapotranspiration sensors to set an efficient water use schedule.

c) **Construction Purposes**: Recycled or other approved non-Potable Water must be used for construction purposes when available.

d) **Limits on Building Permits**: The City will limit or withhold the issuance of building permits which require new or expanded water service, except to protect the public health, safety and welfare, or in cases which meet the City's adopted Conservation offset requirements.

e) **Water Recycling Required if Alternative Available**: The use of Potable Water, other than Recycled Water, is prohibited for specified uses after the City has provided to the Customer an analysis showing that Recycled Water is a cost-effective alternative to Potable Water for such uses and the Customer has had a reasonable time, as determined by the Public Works Director, to make the conversion to Recycled Water.

f) **Water Recycling – New Service:** Prior to the connection of any new water service, an evaluation must be done by the City to determine whether Recycled Water exists to supply all or some of the water needed and Recycled Water must be utilize to the extent feasible.

Section 76.4.120 Hardship Waiver

a) **Undue and Disproportionate Hardship:** If, due to unique circumstances, a specific requirement of this Article would result in undue hardship to a Person using water or to property upon which water is used, that is disproportionate to the impacts to Water Users generally or to similar property or classes of Water Users, then the Person may apply for a waiver to the requirements in accordance with administrative procedures established by the City.

Section 76.4.130 Penalties and Violations

a) **Misdemeanor:** Any Person who violates any provision of this Article is guilty of a misdemeanor punishable by imprisonment in the county jail for not more than 30 days, or by a fine not exceeding $1,000, or by both fine and imprisonment.

b) **Civil Penalties:** In additional to all other remedies, the City may issue civil penalties for failure to comply with any provisions of this Article are as follows:

   1) **First Violation:** The City will issue a written warning and deliver a copy of this ordinance by mail.

   2) **Second Violation:** The City will issue a second written warning and deliver a copy of this ordinance by mail.

   3) **Third Violation:** A third violation within the preceding 12 calendar months is subject to fine not to exceed $100. This fine will incorporated into the Customer's water bill. Non payment will be subject to the same remedies as non payment of basic water rates.

   4) **Fourth Violation:** A fourth violation within the preceding 12 calendar months is subject to a fine not to exceed $250. This fine will be incorporated into the Customer's water bill. Non payment will be subject to the same remedies as non payment of basic water rates.

   5) **Fifth and Subsequent Violations:** A fifth and subsequent violation is subject to a fine not to exceed $500. This fine will be incorporated into the Customer's water bill. Non payment will be subject to the same remedies as non payment of basic water rates.

      i) **Water Flow Restrictor:** In addition to any fines, the City may install a water flow restrictor device of approximately one gallon per minute capacity for services up to one and one-half inch size and comparatively sized restrictors for larger services after written notice of intent to install a flow restrictor for a minimum of 48 hours.

      ii) **Termination of Service:** In addition to any fines and the installation of a water flow restrictor, the City may disconnect and/or terminate a Customer's water service.

c) **Cost of Flow Restrictor and Disconnecting Service:** A Person or entity that violates this Article is responsible for payment of the City's charges for installing and/or removing any flow restricting device and for disconnecting and/or reconnecting service per the City's schedule of charges then in effect. The charge for installing and/or removing any flow restricting device must be paid to the City before the device is removed. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.

d) A violation of this Article is declared to be a public nuisance and may be abated by the City in accordance with its authority to abate nuisances.

e) The penalties and remedies listed in this Article are not exclusive of any other penalties and remedies available to the City under any applicable federal, state or local law and it is within the discretion of the City to seek cumulative penalties and remedies."

SECTION 3
Any inconsistent provisions of the Torrance Municipal Code, or any other inconsistent ordinances of the City, are repealed, to the extent of the inconsistencies.

SECTION 4
If any section, subsection, sentence, clause, phrase, or portion of this Ordinance is for any reason deemed or held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision will not affect that validity of the remaining portion of this Ordinance. The City Council of the City of Torrance hereby declares that it would have adopted this Ordinance and each section, subsection, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, phrases, or other portions might subsequently be declared invalid or unconstitutional.

SECTION 5
This ordinance will take immediate effect upon its adoption pursuant to Water Code section 376. Within ten days following adoption, this ordinance will be published at least once in the Daily Breeze, a newspaper of general circulation, published and circulated in the City of Torrance.

INTRODUCED, APPROVED, and ADOPTED the 24th day of March, 2009.

/s/ Frank Scotto
Mayor Frank Scotto
ATTEST:

APPROVED AS TO FORM:
JOHN FELLOWS III, City Attorney

by /s/ Ronald Pohl
Ronald T. Pohl, Assistant City Attorney

/s/ Sue Herbers
Sue Herbers, City Clerk

TORRANCE CITY COUNCIL ORDINANCE NO. 3717

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss
CITY OF TORRANCE)

I, Sue Herbers, City Clerk of the City of Torrance, California, do hereby certify that the foregoing Ordinance was duly adopted and passed by said Council at a regular meeting held on the 24th day of March 2009 by the following roll call vote:

AYES:	COUNCILMEMBERS:	Barnett, Brewer, Furey, Numark, Rhilinger, Sutherland, and Mayor Scotto.
NOES:	COUNCILMEMBERS:	None.
ABSTAIN:	COUNCILMEMBERS:	None.
ABSENT:	COUNCILMEMBERS:	None.

/s/ Sue Herbers
Sue Herbers,
City Clerk of the City of Torrance

Appendix H: City Ordinance 3392: Reclaimed Water

City of Torrance 2010 Urban Water Management Plan

SECTION 76.5.1. PURPOSE.

The purpose of this Article is to:

a) Establish a City policy with regard to the use of reclaimed water that is consistent with State of California law that declares “that the use of potable domestic water for various non-potable uses is a waste or an unreasonable use of water, and prohibits a person or public agency from using potable domestic water for these uses, if reclaimed water is available and specified requirements are met.”

b) Preserve the reliability of the potable public water supply during times of water shortage by diversification of source of supply through the use of reclaimed water for various non-potable uses.

c) Provide an alternative water supply source that will, in the long term, lower overall water costs to water customers in the City.

d) Provide a uniform means of implementing a reclaimed water program in the City.

SECTION 76.5.2. DEFINITIONS.

For purposes of this Article, the following definitions shall apply:

a) Agricultural Purposes. Agricultural purposes include the growing of field and nursery crops, row crops, trees and vines, and the feeding of fowl and livestock.

b) “Artificial Lake” means a human-made lake, pond, lagoon or other body of water that is used wholly or partly for landscape, scenic or noncontact recreational purposes.

c) “Cost Competitive Water Pricing” shall mean that the price charged water users for reclaimed water shall be less than or equivalent to water rates for potable water furnished by the Torrance Municipal Water Department, taking into account all capital, water quality related or other costs for converting to the use of reclaimed water and the present and projected costs of supplying, delivering and treating potable domestic water for these uses.

d) “Development Project” shall have the same meaning as Section 65928 of the California Government Code.

e) “Economically Feasible” shall mean that the intended reclaimed water application be cost effective for both the reclaimed water supplier (i.e., City of Torrance Municipal Water Department) and the prospective reclaimed water user, taking into account all appropriate costs related to the provision of said reclaimed water service.

f) “Greenbelt Areas” means an area primarily devoted to nonagricultural open space. Greenbelt areas include, but are not limited to, golf courses, cemeteries, parks and landscaping.

g) “Industrial Process Water” means water used by any industrial facility with process water requirements, which include, but are not limited to, rinsing, washing, cooling, circulation, other process or construction.

h) “Off-Site Facilities” means water facilities from the source of supply to the point of connection with the on-site facilities, including the water meter.

j) “Potable Water” means water that conforms to the federal, state, and local standards for human consumption.

k) Reclaimed Water. Reclaimed water means waste water that, as the result of treatment, is suitable for a direct beneficial use or controlled use that would not otherwise occur.

l) “Reclaimed Water Distribution System” means a piping system intended for the delivery of reclaimed water only, that is separate from any potable water distribution system.

m) “Technically Feasible” shall mean that the use of reclaimed water shall be achievable with the application of current available technology, and whether the uses, processes or equipment used on the site can safely and effectively be operated with reclaimed water. If required, an independent evaluation will be undertaken to determine technical feasibility.

SECTION 76.5.3. USE OF RECLAIMED WATER.

a) In order to preserve fresh water aquifers, prevent saltwater intrusion into aquifers, and reduce the use of, and dependence upon, limited potable water supplies, reclaimed water shall be used in areas designated by the City providing its use is economically justified, financially and technically feasible, cost competitive with alternative potable water supplies furnished by the Torrance Municipal Water Department and consistent with legal requirements and the preservation of public health, safety, welfare and the environment.

b) Reclaimed water delivery systems in the City will be constructed on a phased basis in a manner that is economically and technically feasible.

SECTION 76.5.4. EVALUATION OF DEVELOPMENT PERMITS.

Every subdivision, parcel map, or other development permit application, within the designated reclaimed water service area shall be reviewed to determine if the use of reclaimed water would be feasible for landscape irrigation, cooling tower use, or other application. The use of reclaimed water will be required if the following conditions exist:

a) Reclaimed water is available to the user and meets the requirements of the State Department of Health Services.

b) The use of reclaimed water will not cause any loss or diminution of any existing water right.

c) The irrigation system, reclaimed water distribution system, cross-connection control and monitoring methods can be designed to meet the standards required by the State of California.

d) Appropriate control measures can be provided in accordance with the standards of the State of California where the use of reclaimed water will, or might, create a mist.

e) Reclaimed water service is both economically and technically feasible and cost competitive for prospective reclaimed water customers.

SECTION 76.5.5. ORDER OF SERVICE.

Reclaimed water will be served first to those properties that have the necessary on-site facilities installed and are ready for use.

SECTION 76.5.6. AGREEMENT FOR SERVICE.

a) Any person, firm or corporation applying for use of reclaimed water must agree in advance on the amount of reclaimed water to be used on the property in order that the limited supply may be apportioned.

b) As an option, any person, firm or corporation entering into a voluntary agreement with the City for reclaimed water service shall be excluded from the requirements of this Article.

SECTION 76.5.7. FUTURE USERS.

In the event a development application is reviewed and found to be a suitable application for the use of reclaimed water, but reclaimed water is not yet available to the property, such development permit shall be conditioned to require an appropriate reclaimed water distribution system within the project to accommodate reclaimed water at such time as reclaimed water becomes available to the site.

SECTION 76.5.8. CONVERSION TO RECLAIMED WATER.

a) The City Engineer, in consultation with prospective reclaimed water users, shall implement a program of review of each parcel of property within the City to determine which parcels would be appropriate for using reclaimed water for industrial processing, landscape irrigation, or other appropriate uses by the then existing users.

b) In making such determination, the City Engineer, in consultation with prospective reclaimed users, shall consider, but not be limited to, the following factors:

1) Whether reclaimed water is available to the site.

2) Whether the uses, processes or equipment used on the site can safely and effectively be operated with reclaimed water.

3) Whether it is feasible to modify on-site facilities to utilize reclaimed water.

4) Whether the use of reclaimed water would be cost effective, technically feasible and cost competitive for prospective reclaimed water customers.

c) If a property is identified as being suitable for use of reclaimed water and reclaimed water is available to the site, the property owner shall be so notified.

d) Within six (6) months of such notification, the property owner or the occupant of the property must either: apply for the use of reclaimed water and commence the necessary work to convert to reclaimed water, or provide satisfactory evidence to the City that conversion of the site to use reclaimed water is not technically or economically feasible, or would result in the loss or diminution of an existing water right, or would be harmful to the public health, safety, welfare or to the environment. At the time of commencing the work, the property owner shall furnish the City a schedule showing the time frame of when the conversion work will be completed. The City

e) In the event the property owner or the occupant fails, neglects, or refuses to convert to the use of reclaimed water, such owner or occupant shall pay to the City a surcharge on the amount of potable water used on the site in an amount to be set from time-to-time by resolution of the City Council.

SECTION 76.5.9. TEMPORARY DISCONTINUANCE OF SERVICE.

a) In the event reclaimed water supplies should be temporarily reduced such that not all reclaimed water users can be served, the City shall continue to serve those users deemed to be critical users and may temporarily discontinue reclaimed water service to those users deemed to be noncritical users.

b) For purposes of this Section, the following definitions shall apply:

1) Critical users are those users who utilize large quantities of reclaimed water and for whom a reduction or discontinuance of reclaimed water supplies would result in either unusual demands on the potable water supply, reduced production, or cessation of operations.

2) Noncritical users are those users of reclaimed water who utilize smaller quantities of reclaimed water and for whom discontinuance would either result in minimum demands on the potable water supplies, or for whom a temporary discontinuance of reclaimed water would have minimal or no effect on production or overall operations.

SECTION 76.5.10. DISCONTINUANCE OF SERVICE BY USER.

a) Any reclaimed water user that discontinues the use of reclaimed water to any property may subsequently reapply for reclaimed water service, but such service will be approved only if there is an adequate supply of reclaimed water available.

b) Any user of reclaimed water that discontinues use without reasonable cause shall pay the surcharge price for potable water thereafter.

SECTION 76.5.11. DISCONTINUANCE OF SERVICE BY CITY.

The City may discontinue the supply of reclaimed water to any property in order to supply a more critical user. In such event, the user that is discontinued will be reconnected to the potable water supply without payment of the surcharge.

SECTION 76.5.12. RECLAIMED WATER METERING AND INSTALLATION.

a) Reclaimed water shall only be served from a separate meter and connection to the property located a minimum of ten (10) feet horizontally from the domestic service.

b) Each such plumbing installation shall be subject to inspection prior to the service of reclaimed water to assure that no cross-connection between the two (2) water systems exists or is possible by means of such things as anti-siphon devices, cross-connecting preventers, or separate, distinct markings of the plumbing fixtures, faucets and piping.

SECTION 76.5.13. CONDITIONS OF SERVICE.

a) In order to implement the provisions of the subject reclaimed water ordinance, the City Engineer shall develop conditions of service delineating appropriate procedures, processes and rules for implementing the use of reclaimed water in the City. The conditions of service shall include, but are not limited to, technical specifications, standards, cross-connection requirements, application procedures and other procedures as required.

b) The conditions of service shall be amended by the City Engineer as required.

SECTION 76.5.14. APPEAL PROCESS.

a) A prospective reclaimed water user may within thirty (30) days of receipt of notice requiring that the subject water user either incorporate or convert to reclaimed water for certain water uses on the subject property, in accordance with the provisions of the ordinance codified in this Article, may file a written request to the City Engineer for appeal stating the reasons why the use of reclaimed water would not be feasible.

b) If the appeal is denied by the City Engineer, the applicant may submit the appeal to a board, appointed by the City Manager, to be known as the Reclaimed Water Administrative Hearing Board.

c) The decision of the Administrative Hearing Board shall be final, except that an appeal may be filed with the City Council by any person reasonably affected by the use of reclaimed water if the person is not in agreement with the decision of the Administrative Hearing Board. The appeal to City Council shall be in accordance with Article 5, Chapter 1, Division 1 of the Torrance Municipal Code commencing at Section 11.5.1.

Appendix I: MWD 2010 RUWMP Sections II & IV

City of Torrance 2010 Urban Water Management Plan

Planning for the Future

2

The purpose of this section is to show how Metropolitan plans to meet Southern California's water supply needs in the future. In its role as supplemental supplier to the Southern California water community, Metropolitan faces ongoing challenges in meeting the region's needs for water supply reliability and quality. Increased environmental regulations and competition for water from outside the region have resulted in changes in delivery patterns and timing of imported water supply availability. At the same time, the Colorado River watershed has experienced a protracted drought since 1999 while total water demand continues to rise within the region because of population and economic growth.

As described in the previous chapter, the water used in Southern California comes from a number of sources. About one-third comes from local sources, and the remainder is imported from three sources: the Colorado River, the Sacramento-San Joaquin River Delta (via the State Water Project), and the Owens Valley and Mono Basin (through the Los Angeles Aqueducts).[1]

Because of competing needs and uses associated with these resources, and because of concerns related to regional water operations, Metropolitan has undertaken a number of planning initiatives over the past fifteen years. This Regional Urban Water Management Plan summarizes these efforts, which include the Integrated Resources Plan (IRP), two IRP Updates, the Water Surplus and Drought Management Plan, the Water Supply Allocation Plan, and the Long-term Conservation Plan. Collectively, they provide a policy framework with guidelines and resource targets for Metropolitan to follow into the future.

While Metropolitan coordinates regional water supply planning for the region through its inclusive integrated planning processes, Metropolitan's member agencies also conduct their own planning analyses – including their own urban water management plans – and may develop projects independently of Metropolitan. Appendix A.5 shows a list of these potential local projects provided to Metropolitan by its member agencies.

[1] Although the water from the Los Angeles Aqueduct is imported, Metropolitan considers it a local source because it is managed by the Los Angeles Department of Water and Power and not by Metropolitan.

2.1 Integrated Resource Planning

The 1996 IRP Process

Acknowledging the importance of water to the economic and social well-being of Southern California, Metropolitan has gradually shifted roles from an exclusive supplier of imported water to a regional water planner working in collaboration with its member agencies. After the drought of 1987-1992, Metropolitan recognized the changed conditions and the need to develop a long-term water resources strategy to fulfill the agency's mission of providing a high-quality reliable water supply to its service area. This planning process that was undertaken is now known as the Integrated Resources Plan (IRP). The first IRP was adopted by Metropolitan's Board in 1996 and guided by six objectives established early in the process:

1. Ensuring Reliability
2. Ensuring Affordability
3. Ensuring Water Quality
4. Maintaining Diversity
5. Ensuring Flexibility
6. Acknowledging Environmental and Institutional Constraints.

One of the fundamental outcomes of the IRP was the recognition that regional water supply reliability could be achieved through the implementation of a diverse portfolio of resource investments and conservation measures. The resulting IRP strategy was a balance between demand management and supply augmentation. For example, in its dry year profile, the resource framework counted on almost equal proportion of water conservation and recycled water as withdrawal from storage and water transfers. The IRP also balanced between the use of local resources and imported supplies. In a dry year, about 55 percent of the region's water resources come from local resources and conservation. Additionally, through the IRP process Metropolitan found solutions that offer long-term reliability at the lowest possible cost to the region as a whole.

The 1996 IRP, as a blueprint to resource program implementation, also established the "Preferred Resource Mix that would provide the Metropolitan region with reliable and affordable water supplies through 2020.

The IRP provided details on the Preferred Resource Mix and guidelines to established broad resource targets for each of the major supplies available to the region including:

- Conservation
- Local Resources - Water Recycling, Groundwater Recovery and Desalination
- Colorado River Supplies and Transfers
- State Water Project Improvement
- In-Region Surface Reservoir Storage
- In-Region Groundwater Storage

The 2004 IRP Update

In 2004, the Metropolitan Board adopted an updated IRP. Various legislative issues concerning population growth and water supply called for further planning considerations of these changed conditions. This IRP Update had three objectives:

1. Review the goals and achievements of the 1996 IRP
2. Identify the changed conditions for water resource development
3. Update resource development targets through 2025

The 2004 IRP process fulfilled the new objectives and updated the long-term plan to account for new water planning legislation. The updated plan contained resource development targets through 2025, which reflected changed conditions; particularly increased conservation savings, planned increases in local supplies and uncertainties. The 2004 IRP also explicitly recognized the need to handle uncertainties inherent in any planning process. For the water industry, some of these uncertainties are the level of population and economic growth which directly drive water demands, water quality regulations, new chemicals

found to be unhealthful, endangered species affecting sources of supplies, and periodic and new changes in climate and hydrology. As a result, a key component of the Updated Plan was the addition of a 10 percent planning buffer. The planning buffer provided for the identification of additional supplies, both imported and locally developed, that can be implemented to address uncertainty in future supplies and demands.

2010 Integrated Water Resources Plan Update

Metropolitan and its member agencies face increasing uncertainties and challenges as they plan for future water supplies. The 1996 and 2004 IRP resource strategies emphasized the need for a diverse and adaptable water supply strategy to cope with changing circumstances and conditions. Recent history and events have highlighted several emerging trends that need to be addressed in the context of the region's water supply planning and reliability. These trends cover a wide range of considerations including climate change, energy use and greenhouse gas emissions, endangered species protection and conveyance needs in the Sacramento-San Joaquin River Delta system. These trends point strongly to the importance of updating the region's Integrated Resources Plan, and to the need to solidify adaptive strategies to address additional challenges into the long-term future.

The basic objectives of the current IRP process are to:

1. Review the achievements of the 1996 IRP and the 2004 Update
2. Identify changing conditions affecting water resource development
    - Attention will be given to emerging factors and considerations, such as the current drought, climate change, energy use, and changes in Delta pumping operations
3. Update resource development targets through 2030
    - Discussion will focus on adaptation to future uncertainties, and potential alternatives for further diversifying Metropolitan's water resource portfolio and increasing supply reliability in the face of changing circumstances

Public Process

The current IRP Update process has sought input from member agencies, retail water agencies, other water and wastewater managers, environmental, business and community interests. In the fall of 2008, Metropolitan's senior management, Board of directors, member agency managers, elected officials, and community groups collectively discussed strategic direction and regional water solutions at a series of four stakeholder forums; nearly 600 stakeholders participated in the forums.

Similar types of ideas and issues were raised by the participants at all the forums, emphasizing the importance of local resources development and resolving issues with the Delta. Participants suggested that Metropolitan should take a leadership position in several areas including:

- Providing outreach to legislators concerning needs for water supply reliability and quality improvements
- Developing brine lines to enhance recycled water use
- Fostering partnerships with energy utilities
- Building relationships with environmental community
- Participating in research and development of new technologies
- Providing assistance to retail agencies in designing "correct" tiered rate structures

Technical Workgroup Process

Following the stakeholder forums, Metropolitan embarked upon a Technical Workgroup Process to further explore some of the issues and opportunities identified by forum participants. To facilitate the workgroup process, the technical discussions were grouped into six resource areas:

- Conservation
- Graywater
- Groundwater
- Recycled water
- Stormwater / Urban Runoff
- Seawater Desalination

The Technical Workgroup process provided a forum for review of the issues associated with each area, and in-depth discussions with area experts. The workgroups included member agency and retail agency staff, other non-governmental organizations, and staff from wastewater and stormwater management agencies, as well as Metropolitan staff and consultants.

Strategic Policy Review

As part of the current IRP update process, Metropolitan's Board initiated a Strategic Policy Review. This Review examined the ramifications of alternative roles for Metropolitan, member agencies and local retail agencies in future development of water resources. The process explored three alternative policy cases:

1. Current approach – continuation of IRP policies and partnerships with member agencies
2. Imported focus – Metropolitan focuses on addressing Delta issues, imported supplies and water transfers and leaves local supply development entirely to member agencies
3. Enhanced Regional focus – Metropolitan examines new approaches, up to and including development and ownership for implementing large regional scale water recycling, groundwater recharge and seawater desalination

A study of water supply reliability and cost impacts associated with these approaches found that it is in the region's best interest for Metropolitan to continue to explore ways of increasing regional reliability and not limiting itself to singular areas like addressing Delta issues. The study results under this process was a broader view of Metropolitan's role in comprehensive planning and implementation for regional reliability; adopting an adaptive resource development plan for the future may provide the most benefit for the region. In this adaptive approach, Metropolitan may need to take on an enhanced role in local supply development, in order to best adapt and respond to changing regional conditions and lay a solid foundation for future reliability. This role could include the creation of partnership with local agencies or Metropolitan's direct ownership of local projects to ensure regional reliability. The adaptive approach would be incorporated into the 2010 IRP for Board consideration.

Uncertainty Analysis

A major component of the current IRP update effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies, and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, will be incorporated in to the update and accounted for. A key evolution from the 2004 IRP will be the identification of vulnerabilities and contingency actions that will extend the concept of a Planning Buffer into tangible actions that will enable construction and implementation of contingency supplies if they are needed.

Adaptive Planning Implementation

Regional water supply reliability largely depends on Metropolitan's preparedness to adapt to supply uncertainties. An adaptive management approach was utilized in developing a strategy that will prepare the region to deal with unforeseen supply shortages. An important step in this approach is identifying where additional water supply will come from. Four local water sources were considered:

- Stormwater
- Recycled Water
- Graywater
- Seawater

The stakeholder groups established during the IRP process evaluated the viability of using one or more of these resources to supplement existing water supply in the region. The stakeholders (e.g., member agencies, retail agencies, and industry experts) gathered important information on each resource such as regional development status, yield potential, and implementation challenges.

Another key aspect of this strategy is determining what actions are required to eliminate or mitigate the implementation challenges in developing these resources. The adaptive approach essentially provides a blueprint on how to address these challenges and develop supply within each resource.

The most important aspect of this strategy is the adaptive management approach used in responding to potential water supply shortage. The implementation elements identified within each blueprint can be executed at varying levels of urgency. Under the adaptive approach, Metropolitan developed three alternative implementation schedules for each resource:

- Status Quo
- Proactive
- Aggressive

Status Quo entails delaying action until a trigger is met. A trigger sets the point in time at which a potential shortage is identified and when deliberate action is taken to mitigate that shortage. The Proactive schedule implements low-risk actions early-on regardless of whether a trigger occurs. Implementing these low-risk actions shortens the overall time required to complete the implementation schedule. The Aggressive option implements both low-risk and medium-to-high risk actions that may require significant investment (e.g. land acquisition). By initiating these actions early-on, the overall implementation time can be shortened significantly. Table 2-1 highlights the differences between each schedule.

Table 2-1
Schedule Options

Schedule Option	Brief Description	Timeframe from Trigger to Production Yield	Financial Risk
Status Quo	Delay action until the adaptive management trigger occurs	Long	Low
Proactive	Begin planning actions (generally lower cost) before the adaptive management trigger occurs	Medium	Medium
Aggressive	Perform project implementation actions, such as land acquisition, before the adaptive management trigger occurs	Short	High

This strategy also utilizes an adaptive approach for determining an optimal project mix, or portfolio, used to meet a supply gap. The portfolio can comprise of projects from any of the four resources. Project drivers such as cost, yield, implementation time, and location of the project will be used to create customized portfolios that could address specific needs. For example, if a water supply shortage is occurring in a specific area, the portfolio could contain projects that serve that area. Another example might entail selecting projects that have the shortest implementation time in order to expedite supply development. Yet another example might involve selecting the most cost-efficient projects ($/AF) regardless of implementation time or location if minimizing costs is of highest priority. Furthermore, the number of projects within a portfolio is scalable based on the level of shortage at hand. This comprehensive approach is illustrated in Figure 2-1.

Metropolitan's adaptive approach is basically organized into four individual sections referred to as Foundational Studies. These individual studies discuss in detail the implementation challenges and recommended action for each resource. The first step in developing planning actions is categorizing the implementation challenges within each resource. In most cases the categories represent common themes such as establishing funding projects (Funding) or garnering legislative support (Legislative). The next step in developing planning actions is identifying implementation elements that mitigate the implementation challenges. This step involves identifying specific actions that are needed to support each implementation element. The last step in this process is developing of timelines and implementation schedules. Three alternative implementation schedules are developed for each resource.

Tables 2-2 through 2-5 summarize the categories and implementation elements for each resource. Detailed actions and schedules can be found in the foundational studies.

Figure 2-1 Comprehensive Approach

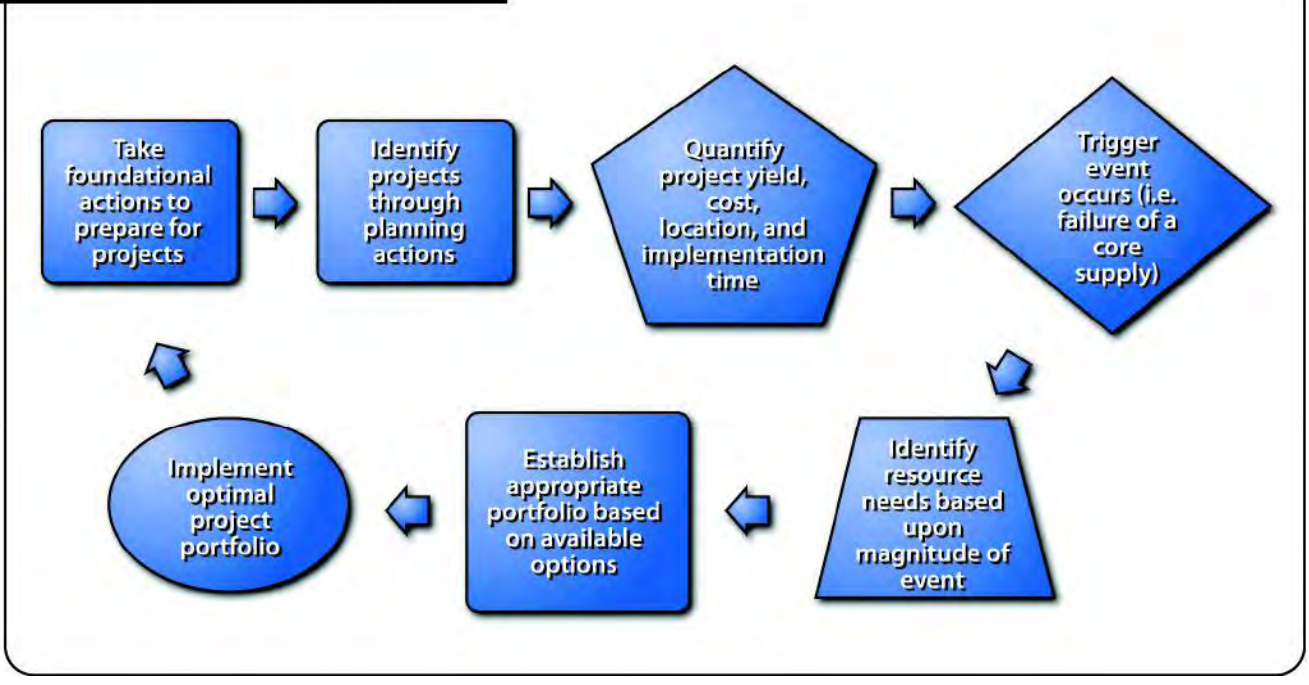


Table 2-2
Stormwater Issue Categories and Implementation Elements

Category	Implementation Element
Data Management	Regional Water Supply Project Database
Legislative/Regulatory/Education	Regional Synergy Task Force
Procedural	Regional Implementation Partnerships
Technical	Regional Feasibility Study
Funding	Funding Strategy Plan
Operational	Local Resource Baseline Plan
Implementation Planning	Alternatives Analysis Plan
Project Implementation	Incentive Programs Land Acquisition Advanced Planning Design Construction
Post Construction	O&M Performance Monitoring

Table 2-3
Recycled Water Issue Categories and Implementation Elements

Category	Implementation Element
Public Perception	Recycled Marketing Campaign Recycled Water Educational Campaign
Legislative	Recycled Water Legislative Task Force
Funding	Regional Recycled Water Finance Committee
Procedural	Regional Recycled Water Permitting and Inspection JPA Regional Recycled Water Policy Task Force
Operational	Regional Salt Management Plan Regional Basin Management Plan Recycled Water Blue Ribbon Panel (SWRCB) Regional Recycled Water Facility Plan
Facility	Regional Project (CIP) Implementation Joint Groundwater Replenishment Project

Table 2-4
Graywater Issue Categories and Implementation Elements

Category	Implementation Element
Public Perception	Graywater Marketing Campaign Graywater Educational Campaign
Legislative	Graywater Legislative Task Force
Technical	Regional Graywater Feasibility Study
Funding	Regional Graywater Finance Committee
Procedural	Regional Graywater Permitting and Inspection Regional Graywater Policy Task Force
Operational	Regional Graywater Management Plan
Construction	Regional Project Implementation

Table 2-5
Desalination Issue Categories and Implementation Elements

Category	Implementation Element
Data Management	Regional Water Supply Project Database
Legislative/Regulatory/Education	Regional Synergy Task Force
Procedural	Regional Implementation Partnerships
Technical	Regional Feasibility Study
Funding	Funding Strategy Plan
Operational	Local Resource Baseline Plan
Project Implementation	Incentive Programs Alternatives Analysis Plan Land Acquisition Advanced Planning Design Construction
Post Construction	O&M Performance Monitoring

Innovative approaches are critical to meeting the water supply needs of Southern California. Maintaining reliable water supplies given regulatory uncertainty, competing uses of groundwater and surface water, and overall variability in water supply is a growing challenge. An adaptive regional approach that develop, promote, and practice integrated regional water management of both traditional and emerging supplies may be the key to continued regional reliability.

2.2 Evaluating Supply Reliability

The Urban Water Management Plan Act requires that three basic planning analyses be conducted to evaluate supply reliability. The first is a water supply reliability assessment requiring development of a detailed evaluation of the supplies necessary to meet projected demands over at least a 20-year period. This analysis is to consider average, single-year and multi-year drought conditions. The second is a water shortage contingency plan which documents the actions that would be implemented in addressing up to a 50 percent reduction in an agency's supplies. Finally, a plan must be developed specifying the steps that would be taken under a catastrophic interruption in water supplies.

To address these three requirements, Metropolitan developed estimates of future demands and supplies from local sources and from Metropolitan. Supply and demand analyses for the single- and multi-year drought cases were based on conditions affecting the SWP. For this supply source, the single driest year was 1977 and the three-year dry period was 1990-1992. The SWP is the appropriate point of reference for these analyses since it is Metropolitan's largest and most variable supply. For the "average" year analysis 83 years of historic hydrology (1922-2004) were used to estimate supply and demand.

Estimating Demands on Metropolitan

Metropolitan developed its demand forecast by first estimating total retail demands for its service area and then factoring out water savings attributed to conservation.[2] Projections of local supplies then were derived using data on current and expected local supply programs and the IRP Local Resource Program Target. The resulting difference between total demands net of conservation and local supplies is the expected regional demands on Metropolitan supplies. These various estimates are shown in Tables 2-6 through 2-8. Major categories used in these tables are defined below.

Total Demands

Total demand is the sum of retail demand for M&I and agricultural, seawater barrier demand, and replenishment demand. Total demand represents the total amount of water needed by the member agencies. Total demands include:

- Retail Municipal and Industrial (M&I) — Retail Municipal and Industrial (M&I) demands represent the full spectrum of urban water use within the region. These include residential, commercial, industrial, institutional and un-metered water uses. To forecast urban water demands Metropolitan used the MWD-MAIN Water Use Forecasting System (MWD-Main), consisting of econometric models that have been adapted for conditions in Southern California. The demographic and economic data used in developing these forecasts were taken from the Southern California Association of Government's (SCAG) 2007 Regional Transportation Plan and from the San Diego County Association of Government's (SANDAG) Series 12: 2050 Regional Growth Forecast (Feb 2010). The SCAG and SANDAG regional growth forecasts are the core assumptions that drive the estimating equations in Metropolitan's MWD-MAIN demand forecasting model. SCAG and SANDAG's projections undergo extensive local review and incorporate zoning information from city and county general plans and are backed by Environmental Impact Reports.

  Impacts of potential annexation are not included in the demand projections for the 2010 RUWMP. However, Metropolitan's Review of Annexation Procedures concluded that the impacts of annexation within the service area beyond 2020 would not exceed 2 percent of overall demands.

[2] Information generated as part of this analysis are contained in Appendix A-1.

- Retail Agricultural Demand — Retail agricultural demands consist of water use for irrigating crops. Member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates their agricultural demand differently, depending on the availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2010 RUWMP
- Seawater Barrier Demand — Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins. Groundwater management agencies determine the barrier requirements based on groundwater levels, injection wells, and regulatory permits.
- Replenishment Demand — Replenishment demands represent the amount of water member agencies plan to use to replenish their groundwater basins. For the 2010 RUWMP, replenishment deliveries are not included as part of firm demands.

Conservation Adjustment

The conservation adjustment subtracts estimated conservation from total retail demand. The conservation estimates consist of three types:

- Code-Based Conservation — Water savings resulting from plumbing codes and other institutionalized water efficiency measures.
- Active Conservation — Water saved as a direct result of programs and practices directly funded by a water utility (e.g., measures outlined by the California Urban Water Conservation Council's "Best Management Practices"). Water savings from active conservation currently completed will decline to zero as the lifetime of those devices is reached. This will be offset by an increase in water savings for those devices that are mandated by law, plumbing codes or other efficiency standards.
- Price Effect Conservation — Reductions in customer use attributable to changes in the real (inflation adjusted) cost of water.

Water Use Reduction Target

On November 10, 2009, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7. This new law is the water conservation component of the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. According to Water Code §10608.36, wholesale agencies are required to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under SBX7-7. Urban wholesale water suppliers are not required to comply with the target-setting and reporting requirements of SBX7-7. Additional discussion of the water reduction target is included in Section 3.7.

Based on Metropolitan's analysis of population and demand and the methodologies for setting targets described in the legislation, compliance with 20x2020 on an individual agency basis throughout the region would result in reduced potable demand of 380 TAF in 2020 through additional conservation and/or recycling. This estimated amount is reflected in the projected demand tables under 20x2020 Retail Compliance.

Local Supplies

Local supplies represent a spectrum of water produced by the member agencies to meet their total demands. Local supplies are a key component in determining how much Metropolitan supply is needed to supplement member agencies local supplies to meet their total demand. Projections of local supplies relied on information gathered from a number of sources including past urban water management plans, Metropolitan's annual local production surveys, and

communications between Metropolitan and member agency staff. Local supplies include:

- Groundwater and Surface Water — Groundwater production consists of extractions from local groundwater basins. Surface water comes from stream diversions and rainwater captured in reservoirs.
- The Los Angeles Aqueduct — A major source of imported water is conveyed from the Owens Valley via the Los Angeles Aqueduct (LAA) by LADWP. Although LADWP imports water from outside of Metropolitan's service area, Metropolitan classifies water provided by the LAA as a local resource because it is developed and controlled by a local agency.
- Seawater desalination — Seawater desalinated for potable use.
- Groundwater Recovery and Recycled Water — Locally developed and operated, groundwater recovery projects treat contaminated groundwater to meet potable use standards. Recycled water projects recycle wastewater for municipal and industrial use.
- Non-Metropolitan Imports — Water supplies imported by member agencies from sources outside of the Metropolitan service area.

The local supply projections presented in demand tables include existing projects that are currently producing water and projects that are under construction. Appendix A.5 contains a complete list of existing, under construction, fully designed with appropriated funds, feasibility, and conceptual projects that are within the service area.

Firm Demands

After calculating the expected regional demands on Metropolitan supplies, projected firm demands were calculated based on Metropolitan's established reliability goal. For the purposes of reliability planning, the 1996 IRP established a reliability goal that states that full service demands at the retail level would be satisfied under all "foreseeable hydrologic" conditions through 2020. This principle has been retained in the current update.

This goal allows for intermittent interruptions to non-firm, discounted rate supplies sold under the Replenishment and Interim Agricultural Water Programs. Thus, firm demand on Metropolitan equals Full Service demands (Tier I and Tier II). For the purpose of analysis, "foreseeable hydrologic conditions" is understood to mean under "historical hydrology," which presently covers the range of historical hydrology spanning the years 1922 through 2004. Tables 2-6 through 2-8 show estimates of firm demands on Metropolitan for single dry-year, multiple dry-year, and average year.

Table 2-6
Metropolitan Regional Water Demands
Single Dry Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,480,000**	**5,662,000**	**5,804,000**	**5,961,000**	**6,101,000**
	Retail Municipal and Industrial	5,000,000	5,194,000	5,354,000	5,515,000	5,653,000
	Retail Agricultural	231,000	213,000	193,000	186,000	186,000
	Seawater Barrier	71,000	72,000	72,000	72,000	72,000
	Groundwater Replenishment	177,000	184,000	186,000	188,000	191,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,260,000**	**2,322,000**	**2,366,000**	**2,405,000**	**2,419,000**
	Groundwater	1,457,000	1,395,000	1,407,000	1,423,000	1,416,000
	Surface Water	98,000	97,000	97,000	97,000	97,000
	Los Angeles Aqueduct	66,000	66,000	66,000	66,000	66,000
	Groundwater Recovery	101,000	108,000	114,000	120,000	126,000
	Total Recycling	348,000	375,000	394,000	410,000	426,000
	Other Imported Supplies	190,000	281,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**2,094,000**	**1,993,000**	**2,025,000**	**2,080,000**	**2,146,000**
	Full Service (Tier I and Tier II)	1,991,000	1,889,000	1,921,000	1,974,000	2,039,000
	Replenishment Service[3]	103,000	103,000	104,000	106,000	107,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
3	**Firm Demands on Metropolitan[5]**	**1,991,000**	**1,889,000**	**1,921,000**	**1,974,000**	**2,039,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2] Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3] Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4] IAWP deliveries will be phased out by 2013.
[5] Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

Table 2-7
Metropolitan Regional Water Demands
Multiple Dry Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,478,000**	**5,702,000**	**5,862,000**	**6,017,000**	**6,161,000**
	Retail Municipal and Industrial	5,004,000	5,232,000	5,409,000	5,572,000	5,715,000
	Retail Agricultural	231,000	214,000	195,000	185,000	184,000
	Seawater Barrier	71,000	71,000	72,000	72,000	72,000
	Groundwater Replenishment	172,000	184,000	187,000	188,000	190,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,171,000**	**2,305,000**	**2,343,000**	**2,378,000**	**2,402,000**
	Groundwater	1,386,000	1,389,000	1,389,000	1,397,000	1,396,000
	Surface Water	91,000	91,000	91,000	91,000	91,000
	Los Angeles Aqueduct	63,000	67,000	71,000	75,000	78,000
	Groundwater Recovery	100,000	107,000	113,000	119,000	125,000
	Total Recycling	340,000	370,000	390,000	407,000	423,000
	Other Imported Supplies	191,000	282,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**2,154,000**	**2,049,000**	**2,106,000**	**2,163,000**	**2,224,000**
	Full Service (Tier I and Tier II)	2,056,000	1,947,000	2,003,000	2,059,000	2,119,000
	Replenishment Service[3]	97,000	102,000	103,000	104,000	104,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
F.	**Firm Demands on Metropolitan[5]**	**2,056,000**	**1,947,000**	**2,003,000**	**2,059,000**	**2,119,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1]Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2]Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3]Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4]IAWP deliveries will be phased out by 2013.
[5]Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

Table 2-8
Metropolitan Regional Water Demands
Average Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,449,000**	**5,632,000**	**5,774,000**	**5,930,000**	**6,069,000**
	Retail Municipal and Industrial	4,978,000	5,170,000	5,330,000	5,491,000	5,627,000
	Retail Agricultural	222,000	205,000	186,000	179,000	180,000
	Seawater Barrier	71,000	72,000	72,000	72,000	72,000
	Groundwater Replenishment	178,000	185,000	187,000	189,000	191,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,395,000**	**2,522,000**	**2,553,000**	**2,581,000**	**2,603,000**
	Groundwater	1,429,000	1,430,000	1,429,000	1,431,000	1,431,000
	Surface Water	103,000	102,000	102,000	102,000	102,000
	Los Angeles Aqueduct	224,000	225,000	226,000	229,000	230,000
	Groundwater Recovery	101,000	108,000	114,000	120,000	126,000
	Total Recycling	348,000	375,000	394,000	410,000	426,000
	Other Imported Supplies	190,000	281,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**1,928,000**	**1,763,000**	**1,808,000**	**1,874,000**	**1,931,000**
	Full Service (Tier I and Tier II)	1,826,000	1,660,000	1,705,000	1,769,000	1,826,000
	Replenishment Service[3]	102,000	103,000	103,000	104,000	105,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
F.	**Firm Demands on Metropolitan[5]**	**1,826,000**	**1,660,000**	**1,705,000**	**1,769,000**	**1,826,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2] Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3] Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4] IAWP deliveries will be phased out by 2013.
[5] Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

2.3 Water Supply Reliability

After estimating demands for single dry year, multiple dry years, and average years the water reliability analysis requires urban water suppliers to identify projected supplies to meet these demands. Table 2-9 summarizes the sources of supply for the single dry year (1977 hydrology), while Table 2-10 shows the region's ability to respond in future years under a repeat of the 1990-92 hydrology. Table 2-10 provides results for the average of the three dry years rather than a year-by-year detail, because most of Metropolitan's dry-year supplies are designed to provide equal amounts of water over each year of a three-year period. These tables show that the region can provide reliable water supplies under both the single driest year and the multiple dry year hydrologies. Table 2-11 reports the expected situation on average over all of the historic hydrologies. Appendix A.3 contains detailed justifications for the sources of supply used for this analysis.

Metropolitan' s supply capabilities are evaluated using the following assumptions:

Colorado River Aqueduct Supplies

Colorado River Aqueduct supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements. The QSA, which is the subject of current litigation, is a component of the California Plan and establishes the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. A detailed discussion of the QSA is included in Section 3. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis.

State Water Project Supplies

State Water Project (SWP) supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively. Under the 2009 draft reliability report, the delivery estimates for the SWP for current (2009) conditions as percentage of maximum Table A amounts, are seven percent, equivalent to 134 TAF, under a single dry-year (1977) condition and 60%, equivalent to 1.15 MAF, under long-term average condition.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Over the last two years under the pumping restrictions of the SWP, Metropolitan has worked collaboratively with the other contractors to develop numerous voluntary Central Valley storage and transfer programs. The goal of this storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Delta Improvements

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (ESAs) have adversely impacted operations and limited the flexibility of the SWP. In response to court decisions related to the Biological Opinions for fish species listed under the ESAs, DWR altered the operations of the SWP. This resulted in export restrictions and reduced SWP deliveries. In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance

and the environment. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Bay-Delta while the long-term solution is implemented.

In the near-term, the physical and operational actions in the Bay-Delta being developed include measures that protect fish species and reduce supply impacts with the goal of reducing conflicts between water supply conveyance and environmental needs. The potential for increased supply due to these near-term fixes is included in the 2010 RUWMP as a 10 percent increase in water supplies obtained from the SWP allocation for the year. In evaluating the supply capabilities for the 2010 RUWMP, additional supplies from this interim fix are assumed to materialize by 2013. Also included as a possible near-term fix for the Bay-Delta is the proposed Two-Gate System demonstration program, which would provide movable barriers on the Old and Middle Rivers to modify flows and prevent fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish and increase SWP supplies.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing the basic elements that include the Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In dealing with these basic issues, the ideal solutions sought are the ones that address both the physical changes required as well as the financing and governance. In evaluating the supply capabilities for the 2010 RUWMP, Metropolitan assumed a new Delta conveyance is fully operational by 2022 that would return supply reliability similar to 2005 condition, prior to supply restrictions imposed due to the Biological Opinions. This assumption is consistent with Metropolitan's long-term Delta Action Plan that recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts to result in a sustainable Bay-Delta, sufficient to avoid biological opinion restrictions on planned SWP deliveries to Metropolitan and the other SWP Contractors. Further, recently passed state legislation included pathways for establishing governance structures and financing approaches to implement and manage the identified elements.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Storage is a major component of Metropolitan's dry-year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing the Water Supply Allocation plan (WSAP), is dependent on its storage resources.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. It is important to note that under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet demands.

Table 2-9
Single Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1977 Hydrology
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct[2]	522,000	601,000	651,000	609,000	610,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,416,000	1,824,000	1,669,000	1,419,000	1,419,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,457,000**	**2,782,000**	**2,977,000**	**2,823,000**	**2,690,000**
Demands					
Firm Demands of Metropolitan	1,991,000	1,889,000	1,921,000	1,974,000	2,039,000
IID-SDCWA Transfers and Canal Linings	180,000	273,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,171,000**	**2,162,000**	**2,201,000**	**2,254,000**	**2,319,000**
Surplus	**286,000**	**620,000**	**776,000**	**569,000**	**371,000**
Programs Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	556,000	556,000	700,000	700,000	700,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**762,000**	**862,000**	**1,036,000**	**1,036,000**	**1,036,000**
Potential Surplus	**1,048,000**	**1,482,000**	**1,812,000**	**1,605,000**	**1,407,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 2-10
Multiple Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1990-1992 Hydrology
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	246,000	373,000	435,000	398,000	353,000
California Aqueduct[2]	752,000	794,000	835,000	811,000	812,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,318,000	1,600,000	1,417,000	1,416,000	1,416,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,248,000**	**2,417,000**	**2,520,000**	**2,459,000**	**2,415,000**
Demands					
Firm Demands of Metropolitan	2,056,000	1,947,000	2,003,000	2,059,000	2,119,000
IID-SDCWA Transfers and Canal Linings	180,000	241,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,236,000**	**2,188,000**	**2,283,000**	**2,339,000**	**2,399,000**
Surplus	**12,000**	**229,000**	**237,000**	**120,000**	**16,000**
Programs Under Development					
In-Region Storage and Programs	162,000	280,000	314,000	336,000	336,000
California Aqueduct	242,000	273,000	419,000	419,000	419,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**404,000**	**553,000**	**733,000**	**755,000**	**755,000**
Potential Surplus	**416,000**	**782,000**	**970,000**	**875,000**	**771,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 2-11
AverageYear
Supply Capability[1] and Projected Demands
Average of 1922-2004 Hydrologies
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct[2]	1,550,000	1,629,000	1,763,000	1,733,000	1,734,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,507,000	1,529,000	1,472,000	1,432,000	1,429,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**3,485,000**	**3,810,000**	**4,089,000**	**3,947,000**	**3,814,000**
Demands					
Firm Demands of Metropolitan	1,826,000	1,660,000	1,705,000	1,769,000	1,826,000
IID-SDCWA Transfers and Canal Linings	180,000	273,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,006,000**	**1,933,000**	**1,985,000**	**2,049,000**	**2,106,000**
Surplus	**1,479,000**	**1,877,000**	**2,104,000**	**1,898,000**	**1,708,000**
Programs Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	382,000	383,000	715,000	715,000	715,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**588,000**	**689,000**	**1,051,000**	**1,051,000**	**1,051,000**
Potential Surplus	**2,067,000**	**2,566,000**	**3,155,000**	**2,949,000**	**2,759,000**

[1] Represents Supply Capability for resource programs under listed year type.

[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.

[3] Colorado River Aqueduct includes water management programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

2.4 Water Shortage Contingency Analysis

In addition to the Water Supply Reliability analysis addressing average year and drought conditions, the Act requires agencies to document the stages of actions that it would undertake in response to water supply shortages, including up to a 50 percent reduction in its water supplies. Metropolitan has captured this planning in its Water Surplus and Drought Management Plan (WSDM Plan) which guides Metropolitan's planning and operations during both shortage and surplus conditions. Furthermore, Metropolitan developed the WSAP which provides a standardized methodology for allocating supplies during times of shortage.

Water Surplus and Drought Management Plan

In April 1999, Metropolitan's Board adopted the Water Surplus and Drought Management Plan (WSDM Plan) [3], included in Appendix A.4. It provides policy guidance for managing regional water supplies to achieve the reliability goals of the IRP and identifies the expected sequence of resource management actions that Metropolitan will execute during surpluses and shortages to minimize the probability of severe shortages and reduce the possibility of extreme shortages and shortage allocations. Unlike Metropolitan's previous shortage management plans, the WSDM Plan recognizes the link between surpluses and shortages, and it integrates planned operational actions with respect to both conditions.

WSDM Plan Development

Metropolitan and its member agencies jointly developed the WSDM Plan during 1998 and 1999. This planning effort included more than a dozen half-day and full-day workshops and more than three dozen meetings between Metropolitan and member agency staff. The result of the planning effort is a consensus plan that addresses a broad range of regional water management actions and strategies.

WSDM Plan Principles and Goals

The guiding principle of the WSDM plan is to manage Metropolitan's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortages to retail customers. From this guiding principle came the following supporting principles:

- Encourage efficient water use and economical local resource programs
- Coordinate operations with member agencies to make as much surplus water as possible available for use in dry years
- Pursue innovative transfer and banking programs to secure more imported water for use in dry years
- Increase public awareness about water supply issues

The WSDM plan also declared that if mandatory import water allocations become necessary, they would be calculated on the basis of need, as opposed to any type of historical purchases. The WSDM plan contains the following considerations that would go into an equitable allocation of imported water:

- Impact on retail consumers and regional economy
- Investments in local resources, including recycling and conservation
- Population growth
- Changes and/or losses in local supplies
- Participation in Metropolitan's Non-firm (interruptible) programs
- Investment in Metropolitan's facilities

WSDM Plan Implementation

Each year, Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage. Each stage is associated with specific resource

[3] Metropolitan Water District of Southern California. *Water Surplus and Drought Management Plan,* Report No. 1150, August, 1999.

management actions designed to (1) avoid an Extreme Shortage to the maximum extent possible and (2) minimize adverse impacts to retail customers if an Extreme Shortage occurs. The current sequencing outlined in the WSDM Plan reflects anticipated responses based on detailed modeling of Metropolitan's existing and expected resource mix.

Surplus Stages

Metropolitan's supply situation is considered to be in surplus as long as net annual deliveries can be made to water storage programs. The WSDM Plan further defines five surplus management stages that guide the storage of surplus supplies in Metropolitan's storage portfolio. Deliveries for storage in the DVL and in the SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage. Deliveries to other storage facilities may be interrupted, depending on the amount of the surplus.

Shortage Stages

The WSDM Plan distinguishes between Shortages, Severe Shortages, and Extreme Shortages. Within the WSDM Plan, these terms have specific meaning relating to Metropolitan's ability to deliver water to its customers.

Shortage: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfers as necessary.

Severe Shortage: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation. In a Severe Shortage, Metropolitan may have to curtail Interim Agricultural Water Program deliveries.

Extreme Shortage: Metropolitan must allocate available supply to full-service customers.

The WSDM Plan also defines seven shortage management stages to guide resource management activities. These stages are not defined merely by shortfalls in imported water supply, but also by the water balances in Metropolitan's storage programs. Thus, a ten percent shortfall in imported supplies could be a stage one shortage if storage levels are high. If storage levels are already depleted, the same shortfall in imported supplies could potentially be defined as a more severe shortage.

When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, it is still able to meet all end-use demands for water. For shortage stages 1 through 4, Metropolitan will meet demands by withdrawing water from storage. At shortage stages 5 through 7, Metropolitan may undertake additional shortage management steps, including issuing public calls for extraordinary conservation, considering curtailment of Interim Agricultural Water Program deliveries in accordance with their discounted rates, exercising water transfer options, or purchasing water on the open market.

Figure 2-2 shows the actions under surplus and shortage stages when an allocation plan would be necessary to enforce mandatory cutbacks. The overriding goal of the WSDM Plan is to never reach Shortage Stage 7, an Extreme Shortage.

At shortage stage 7 Metropolitan will implement its Water Supply Allocation Plan[4] (WSAP) to allocate available supply fairly and efficiently to full-service customers.

Water Supply Allocation Plan

In February 2008 Metropolitan's Board adopted the WSAP. The WSAP includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation.

The WSAP was developed in consideration of the principles and guidelines described in the

[4] Metropolitan Water District of Southern California, Water Supply Allocation Plan, June 2009.

WSDM Plan, with the objective of creating an equitable needs-based allocation. The WSAP formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies of up to 50 percent. The formula takes into account growth, local investments, changes in supply conditions and the demand hardening aspects of non-potable recycled water use and the implementation of conservation savings programs.

Water Supply Allocation Plan Development

Between July 2007 and February 2008, Metropolitan staff worked jointly with Metropolitan's member agencies to develop the WSAP. Throughout the development process Metropolitan's Board was provided with regular progress reports on the status of the WSAP The WSAP was adopted at the February 12, 2008 Board meeting.

The WSAP Formula

The WSAP formula is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations

The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the three most recent non-shortage years, 2004-2006.

Step 2: Allocation Year Calculations

The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population or economic growth and changes in local supplies.

Step 3: Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. Each element and its application in the allocation formula is discussed in detail in Metropolitan's Water Supply Allocation Plan.[5]

Annual Reporting Schedule on Supply/ Demand Conditions

Managing Metropolitan's water supply resources to minimize the risk of shortages requires timely and accurate information on changing supply and demand conditions throughout the year. To facilitate effective resource management decisions, the WSDM Plan includes a monthly schedule for providing supply/demand information to Metropolitan's senior management and Board, and for making resource allocation decisions. Table 2-12 shows this schedule.

[5] Metropolitan Water District of Southern California, Water Supply Allocation Plan, June 2009.

Figure 2-2 Resource Stages, Anticipated Actions, And Supply Declarations

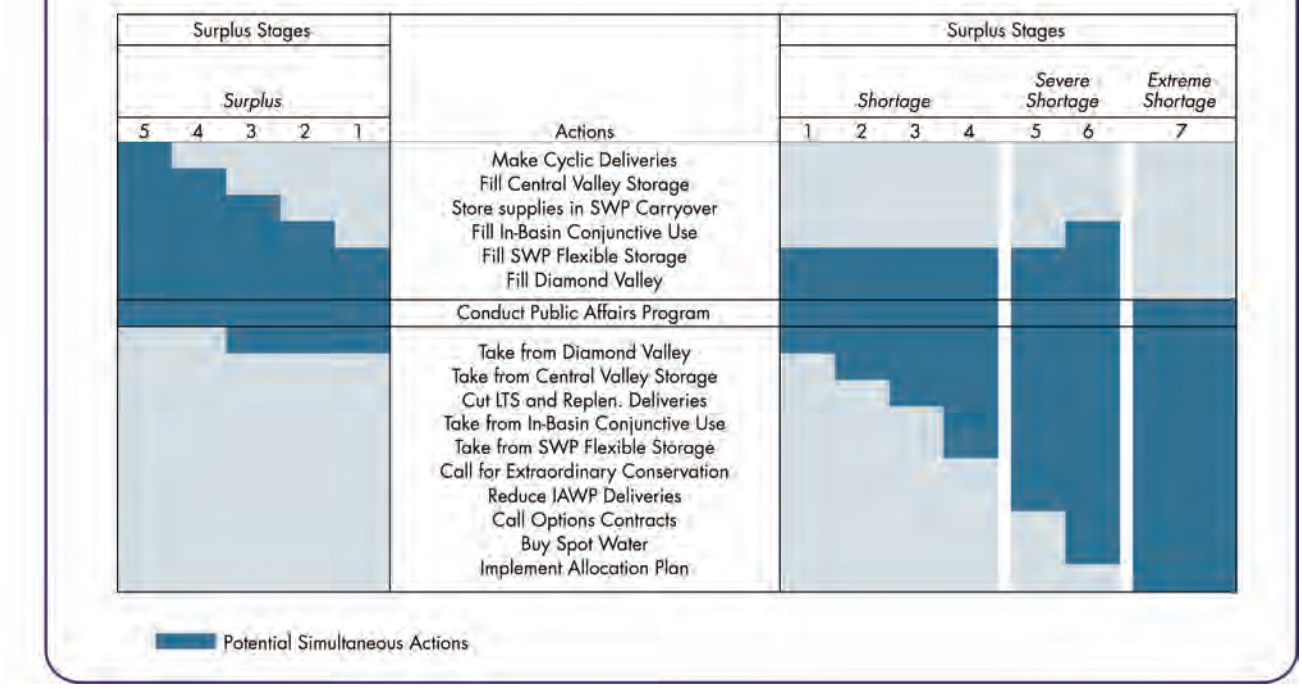


Table 2-12
Schedule of Reporting and Resource Allocation Decision-Making

Month	Information Report/Management Decision
January	Initial supply/demand forecasts for year
February - March	Update supply/demand forecasts for year
April - May	Finalize supply/demand forecasts Management decisions re: Contractual Groundwater and Option Transfer Programs Board decision re: Need for Extraordinary Conservation
October - December	Report on Supply and Carryover Storage
October	Management decisions re: Delivery Interruptions for the Replenishment and Interim Agricultural Water Programs

2.5 Catastrophic Supply Interruption Planning

The third type of planning needed to evaluate supply reliability is a catastrophic supply interruption plan that documents the actions necessary for a catastrophic interruption in water supplies. For Metropolitan this planning is captured in the analysis that went into developing the Emergency Storage Requirements.

Emergency Storage Requirements

Metropolitan established its criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now named Diamond Valley Lake. These criteria were again discussed in the 1996 IRP. Metropolitan's Board has approved both of these documents.

Emergency storage requirements are based on the potential of a major earthquake damaging the aqueducts that transport Southern California's imported water supplies (SWP, CRA, and Los Angeles Aqueduct). The adopted criteria assume that damage from such an event could render the aqueducts out of service for six months. Therefore, Metropolitan has based its planning on a 100 percent reduction in its supplies for a period of six months, which is a greater shortage than required by the Act.

To safeguard the region from catastrophic loss of water supply, Metropolitan has made substantial investments in emergency storage. The emergency plan outlines that under such a catastrophe, non-firm service deliveries would be suspended, and firm supplies to member agencies would be restricted by a mandatory cutback of 25 percent from normal-year demand levels. At the same time, water stored in surface reservoirs and groundwater basins under Metropolitan's interruptible program would be made available, and Metropolitan would draw on its emergency storage, as well as other available storage. Metropolitan has reserved up to half of DVL storage to meet such an emergency, while the remainder is available for dry-year and seasonal supplies. In addition, Metropolitan has access to emergency storage at its other reservoirs, at the SWP terminal reservoirs, and in its groundwater conjunctive use storage accounts. With few exceptions, Metropolitan can deliver this emergency supply throughout its service area via gravity, thereby eliminating dependence on power sources that could also be disrupted by a major earthquake. The WSDM Plan shortage stages will guide Metropolitan's management of available supplies and resources during the emergency to minimize the impacts of the catastrophe.

Electrical Outages

Metropolitan has also developed contingency plans that enable it to deal with both planned and unplanned electrical outages. These plans include the following key points:

- In event of power outages, water supply can be maintained by gravity feed from regional reservoirs such as DVL, Lake Mathews, Castaic Lake and Silverwood Lake.
- Maintaining water treatment operations is a key concern. As a result, all Metropolitan treatment plants have backup generation sufficient to continue operating in event of supply failure on the main electrical grid.
- Valves at Lake Skinner can be operated by the backup generation at the Lake Skinner treatment plant.
- Metropolitan owns mobile generators that can be transported quickly to key locations if necessary.

2.6 Other Supply Reliability Risks

Metropolitan provides water to a broad and heterogeneous service area with water supplies from a variety of sources and geographic regions. Each of these demand areas and supplies has its own unique set of benefits and challenges. Among the challenges Metropolitan faces are the following:

Supplies

- The region and Colorado River Basin have been experiencing drought conditions for multiple years.
- Endangered species protections and conveyance needs in the Sacramento-San Joaquin River Delta System have resulted in operational constraints particularly important because pumping restrictions impact many water resource programs – SWP supplies and additional voluntary transfers, Central Valley storage and transfers, in-region groundwater storage and in-region surface water storage.
- Changing climate patterns are predicted to shift precipitation patterns and possibly affect water supply.
- Difficulty and implications of environmental review, documentation, and permitting for multi-year transfer agreements, recycled water projects and seawater desalination plants.
- Public perception of recycled water use for replenishment.

Operations and Water Quality

- The cost and use of energy and greenhouse gas emissions.
- Water quality regulations and issues like the quagga mussels within the Colorado River Aqueduct. Controlling the spread and impacts of the quagga mussels will require more extensive maintenance and reduced operational flexibility.
- Salt and concentrate balance from variety of sources.

Demand

- Uncertain population and economic growth
- Uncertain location of growth
- Uncertain housing stock and density

The challenges posed by continued population growth, environmental constraints on the reliability of imported supplies, and new uncertainties imposed by climate change demand that Metropolitan assert the same level of leadership and commitment to taking on large-scale regional solutions to providing water supply reliability. New solutions are available in the form of dramatically improved water-use efficiency, indirect potable use of recycled water, and large-scale application of ocean desalinization.

Climate Change

Climate change adds its own new uncertainties to the challenges of planning. Metropolitan's water supply planning has been fortunate in having almost one-hundred years of hydrological data regarding weather and water supply. This history of rainfall data has provided a sound foundation for forecasting both the frequency and the severity of future drought conditions, as well as the frequency and abundance of above-normal rainfall. But, weather patterns can be expected to shift dramatically and unpredictably in a climate driven by increased concentrations of carbon dioxide in the atmosphere, as experienced in Australia. These changes in weather significantly affect water supply planning, irrespective of the debate associated with the sources and cause of increasing concentrations of greenhouse gasses. As a major steward of the region's water supply resources, Metropolitan is committed to performing its due diligence with respect to climate change.

Potential Impacts

While uncertainties remain regarding the exact timing, magnitude, and regional impacts of these temperature and precipitation changes, researchers have identified several areas of concern for California water planners. These include:

- Reduction in Sierra Nevada snowpack;
- Increased intensity and frequency of extreme weather events; and
- Rising sea levels resulting in
  - Increased risk of damage from storms, high-tide events, and the erosion of levees; and
  - Potential pumping cutbacks on the SWP and Central Valley Project (CVP).

Other important issues of concern due to global climate change include:

- Effects on local supplies such as groundwater;
- Changes in urban and agricultural demand levels and patterns ;
- Impacts to human health from water-borne pathogens and water quality degradation;
- Declines in ecosystem health and function; and
- Alterations to power generation and pumping regimes.

Metropolitan's Activities Related to Climate Change Concerns

An extended Colorado River drought put climate change on Metropolitan's radar screen in the mid-1990s. In 2000, Metropolitan's Board received a briefing on the potential impacts of climate change on water supply by leading experts in the field. Metropolitan then hosted a California Water Plan meeting on climate change and a held Drought Preparedness Workshop on similar issues. In March 2002, the Board adopted policy principles on global climate change as related to water resource planning. The Principles stated in part that 'Metropolitan supports further research into the potential water resource and quality effects of global climate change, and supports flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts.'

Knowledge Sharing and Research Support

Metropolitan is an active and founding member of the Water Utility Climate Alliance (WUCA). WUCA consists of ten nationwide water providers collaborating on climate change adaptation and green house gas mitigation issues. As a part of this effort, WUCA pursues a variety of activities on multiple fronts.

WUCA monitors development of climate change-related research, technology, programs and federal legislation. Activities to date include such things as:

- Letter of support for Western Water Assessment's continued funding as a Regional Integrated Sciences and Assessments team under the National Oceanic and Atmospheric Administration (NOAA)
- Letter of support for the 2009 Kerry-Boxer Water Utilities Mitigation and Adaptation Partnerships congressional bill addendum
- Regular communication and consultations with federal agencies on the U.S. Environmental Protection Agency's Climate Ready Water Utility Working Group
- NOAA Climate Service and January 2010 International Climate Change Forum

In addition to supporting federal and regional efforts, WUCA released a white paper entitled "Options for Improving Climate Modeling to Assist Water Utility Planning for Climate Change" in January 2010. The purpose of this paper was to assess Global Circulation Models, identify key aspects for water utility planning and make seven initial recommendations for how climate modeling

and downscaling techniques can be improved so that these tools and techniques can be more useful for the water sector.

In order to address water provider-specific needs, WUCA has focused not only on climate change science and Global Circulation Models, but on how best to incorporate that knowledge into water planning. This was explored more thoroughly in a second January 2010 white paper on decision support methods for incorporating climate change uncertainty into water planning. This paper assessed five known decision support approaches for applicability in incorporating Climate Change uncertainty in water utility planning and identified additional research needs in the area of decision support methodologies.

In addition to these efforts, the member agencies of WUCA annually share individual agency actions to mitigate greenhouse gas emissions to facilitate further implementation of these programs. At a September 2009 summit at the Aspen Global Change Institute WUCA, members met with global climate modelers, along with federal agencies, academic scientists, and climate researchers to establish collaborative directions to progress climate science and modeling efforts. WUCA continues to pursue these opportunities and partnerships with water providers, climate scientists, federal agencies, research centers, academia and key stakeholders.

Metropolitan also continues to pursue knowledge sharing and research support activities outside of WUCA. Metropolitan regularly provides input and direction on California legislation related to climate change issues. Metropolitan is active in collaborating with other state and federal agencies, as well as non-governmental organizations on climate change related planning issues. The following list provides a sampling of entities that Metropolitan has recently worked with on a collaborative basis:

- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- American Water Works Association Research Foundation
- National Center for Atmospheric Research
- California Energy Commission
- California Department of Water Resources

Quantification of Current Research

Metropolitan continues to incorporate current climate change science into its planning efforts. A major component of the current IRP update effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies, and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, will be incorporated into the update and accounted. Overall, Metropolitan's planning activities strive to support the Board adopted policy principles on climate change by:

- Supporting reasonable, economically viable, and technologically feasible management strategies for reducing impacts on water supply
- Supporting flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts, and

- Evaluating staff recommendations regarding climate change and water resources against the California Environmental Quality Act (CEQA) to avoid adverse effects on the environment.

Implementation of Programs and Policies

Metropolitan has made great efforts to implement greenhouse gas mitigation programs and policies for its facilities and operations. To date, these programs and policies have focused on:

- Exploring water supply/energy relationships and opportunities to increase efficiencies;
- Joining the California Climate Action Registry;
- Acquiring "green" fleet vehicles, and supporting an employee Rideshare program;
- Developing solar power at the Skinner water treatment plant; and
- Identifying and pursuing development of "green" renewable water and energy programs that support the efficient and sustainable use of water.

Metropolitan also continues to be a leader in efforts to increase regional water use efficiency. Metropolitan has worked to increase the availability of incentives for local conservation and recycling projects, as well as supporting conservation Best Management Practices for industry and commercial businesses.

2.7 Pricing and Rate Structures

Revenue Management

A high proportion of Metropolitan's revenues come from volumetric water rates; during the last five fiscal years through 2008-09, water sales revenues were approximately 75 percent of Metropolitan's total revenues. As a result, Metropolitan's revenues vary according to regional weather and the availability of statewide water supplies. In dry years, local demands increase and Metropolitan may receive higher than anticipated revenues due to increased sales volumes. In contrast, in wet years demands decrease, and revenues drop due to lower sales volumes. In addition, statewide supply shortages such as those in 1991 and 2009 also affect Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates. To mitigate this risk, Metropolitan maintains financial reserves, with a minimum and maximum balance, to stabilize water rates during times of reduced water sales. The reserves hold revenues collected during times of high water sales and are used to offset the need for revenues during times of low sales.

Another way to mitigate rate increases is by generating a larger portion of revenues from fixed sources. Metropolitan currently has two fixed charges, the Readiness-to-Serve Charge and the Capacity Charge. Metropolitan also collects tax revenue from taxable property within its boundaries. For the last five fiscal years the revenues from fixed charges generated almost 18 percent of all Metropolitan revenues. RTS revenues have been increasing gradually, from $80 million in 2007, to $114 million in 2010, $125 million in 2011, and $146 million in 2012.

Finally, Metropolitan generates a significant amount of revenue from interest income, hydroelectric power sales, and miscellaneous income such as rents and leases. For the last five fiscal years, these averaged almost 7 percent of all Metropolitan revenues. These internally generated revenues are referred to as revenue offsets and reduce the amount of revenue that has to be collected from rates and charges.

Elements of Rate Structure

This section provides an overview of Metropolitan's rate structure. The different elements of the rate structure are discussed below and summarized in Table 2-13.

System Access Rate (SAR)

The SAR is a volumetric system-wide rate levied on each acre-foot of water that moves through the Metropolitan system. All system users (member agency or third party) pay the SAR to use Metropolitan's conveyance and distribution system. The SAR recovers the cost of providing conveyance and distribution capacity to meet average annual demands.

Water Stewardship Rate (WSR)

The WSR recovers the costs of providing financial incentives for existing and future investments in local resources including conservation and recycled water. These investments or incentive payments are identified as the "demand management" service function in the cost of service process. The WSR is a volumetric rate levied on each acre-foot of water that moves through the Metropolitan system.

System Power Rate (SPR)

The SPR recovers the costs of energy required to pump water to Southern California through the SWP and Colorado River Aqueduct. The cost of power is recovered through a uniform volumetric rate. The SPR is applied to all deliveries to member agencies.

Treatment Surcharge

The treatment surcharge recovers the costs of providing treated water service through a uniform, volumetric rate. The treatment surcharge recovers all costs associated with providing treated water service, including commodity, demand and standby related costs.

Capacity Charge

The capacity charge is levied on the maximum summer day demand placed on the system between May 1 and September 30 for a three-calendar year period. Demands measured for the purposes of billing the capacity charge include all firm demand and agricultural demand, including wheeling service and exchanges. Replenishment service is not included in the measurement of peak day demand for purposes of billing the capacity charge.

The capacity charge is intended to pay for the cost of peaking capacity on Metropolitan's system, while providing an incentive for local agencies to decrease their use of the Metropolitan system to meet peak day demands and to shift demands into lower use time periods. Over time, a member agency will benefit from local supply investments and operational strategies that reduce its peak day demand on the system in the form of a lower total capacity charge.

Readiness-To-Serve Charge (RTS)

The costs of providing standby service, including emergency storage and those standby costs related to the conveyance and aqueduct system, are recovered by the RTS.

The RTS is allocated to the member agencies based on each agency's proportional share of a ten-year rolling average of all firm deliveries (including water transfers and exchanges that use Metropolitan system capacity). The ten-year rolling average does not include replenishment service and interim agricultural deliveries because these deliveries will be the first to be curtailed in the event of an emergency. A ten-year rolling average leads to a relatively stable RTS allocation that reasonably represents an agency's potential long-term need for standby service under different demand conditions. Member agencies may choose to have a portion of their total RTS obligation offset by standby charge collections levied by Metropolitan on behalf of the member agency. These standby charges are assessed on parcels of land within the boundaries of a given member agency.

Tier 1 Supply Rate

The costs of maintaining existing supplies and developing additional supplies are recovered through a two-tiered pricing approach. The Tier 1 Supply Rate recovers the majority of the supply costs and reflects the cost of existing supplies. Each member agency has a predetermined amount of water that can be purchased at the lower Tier 1 Supply Rate in a calendar year. Purchases in excess of this limit will be made at the higher Tier 2 Supply Rate.

The Tier 1 Supply rate includes a Delta Supply Surcharge of $69 per AF in 2010, $51 per AF in 2011 and $58 per AF in 2012. This surcharge reflects the impact on Metropolitan's water supply rates due to lower deliveries from the SWP as a result of pumping restrictions designed to protect endangered fish species. The Delta Supply Surcharge will remain in effect until a long-term solution for the delta was achieved or until interim facility improvements restore SWP yield.

Tier 2 Supply Rate

The Tier 2 Supply Rate reflects Metropolitan's cost of developing long-term firm supplies. The Tier 2 Supply Rate recovers a greater proportion of the cost of developing additional supplies from member agencies that have increasing demands on the Metropolitan system.

Replenishment Program and Agricultural Water Program

Metropolitan currently administers two pricing programs that make surplus system supplies (system supplies in excess of what is needed to meet consumptive municipal and industrial demands) available to the member agencies at a discounted water rate. The Replenishment Program provides supplies, when available, for the purpose of replenishing local storage. The Interim Agricultural Water Program (IAWP) makes surplus water available for agricultural purposes. In October 2008, the Board

approved a phase out of the IAWP by 2013. Because of the critically dry conditions and uncertainty about future supply, discounted replenishment deliveries have been curtailed for the past three years. If water supply conditions improve and surplus water becomes available, Metropolitan could make Replenishment service available to its member agencies at discounted rates, subject to meeting Metropolitan's storage objectives to meet full service demands.

Table 2-13
Rate Structure Components

Rate Design Elements	Service Provided/ Costs Recovered	Type of Charge
System Access Rate	Conveyance/Distribution (Average Capacity)	Volumetric ($/AF)
Water Stewardship Rate	Conservation/Local Resources	Volumetric ($/AF)
System Power Rate	Power	Volumetric ($/AF)
Treatment Surcharge	Treatment	Volumetric ($/AF)
Capacity Charge	Peak Distribution Capacity	Fixed/Volumetric ($/cfs)
Readiness-To-Serve Charge	Conveyance/Distribution/Emergency Storage(Standby Capacity)	Fixed ($Million)
Tier 1 Supply Rate	Supply	Volumetric/Fixed ($/AF)
Tier 2 Supply Rate	Supply	Volumetric ($/AF)
Surplus Water Rates	Replenishment/Agriculture	Volumetric ($/AF)

The following tables provide further information regarding Metropolitan's rates. Table 2-14 summarizes the rates and charges effective January 1, 2010, January 1, 2011, and January 1, 2012. Average costs by member agency will vary depending upon an agency's RTS allocation, Capacity Charge and relative proportions of treated and untreated Tier 1, Tier 2, replenishment, and agricultural water purchases. Table 2-15 provides the details of the Capacity Charge, calculated for calendar year 2011.

Table 2-16 provides the details of the Readiness-to-Serve Charge calculation for calendar year 2011 broken down by member agency. Table 2-17 provides the current Purchase Order commitment quantities that member agencies will purchase from Metropolitan over the 10-year period starting January 2003 through December 2012. Tier 1 limits for each member agency are also shown in this table.

Table 2-14
Metropolitan Water Rates and Charges

Effective	Jan 1, 2010	Jan 1, 2011	Jan 1, 2012
Tier 1 Supply Rate ($/AF)	$101	$104	$106
Delta Supply Surcharge ($/AF)	$69	$51	$58
Tier 2 Supply Rate ($/AF)	$280	$280	$290
System Access Rate ($/AF)	$154	$204	$217
Water Stewardship Rate ($/AF)	$41	$41	$43
System Power Rate ($/AF)	$119	$127	$136
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$484	$527	$560
Tier 2	$594	$652	$686
Replenishment Water Rate Untreated ($/AF)	$366	$409	$442
Interim Agricultural Water Program Untreated ($/AF)	$416	$482	$537
Treatment Surcharge ($/AF)	$217	$217	$234
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$701	$744	$794
Tier 2	$811	$869	$920
Treated Replenishment Water Rate ($/AF)	$558	$601	$651
Treated Interim Agricultural Water Program ($/AF)	$615	$687	$765
Readiness-to-Serve Charge ($M)	$114	$125	$146
Capacity Charge ($/cfs)	$7,200	$7,200	$7,400

Table 2-15
Capacity Charge Detail

	Peak Day Demand (cfs) (May 1 through September 30) Calendar Year				
Agency	2007	2008	2009	3-Year Peak	Calendar Year 2011 Capacity Charge ($7,200/cfs)
Anaheim	37.9	36.1	40.7	40.7	$ 293,040
Beverly Hills	33.9	32.9	31.0	33.9	244,080
Burbank	33.7	34.2	21.6	34.2	246,240
Calleguas	260.8	250.0	192.8	260.8	1,877,760
Central Basin	125.9	102.7	94.7	125.9	906,480
Compton	7.1	4.9	5.9	7.1	51,120
Eastern	303.0	263.1	227.8	303.0	2,181,600
Foothill	25.4	21.5	24.3	25.4	182,880
Fullerton	36.9	27.1	37.4	37.4	269,280
Glendale	54.6	55.7	56.0	56.0	403,200
Inland Empire	176.2	125.8	106.1	176.2	1,268,640
Las Virgenes	45.3	45.3	42.7	45.3	326,160
Long Beach	61.3	68.1	67.2	68.1	490,320
Los Angeles	768.5	821.9	698.2	821.9	5,917,680
MWDOC	469.2	453.7	489.5	489.5	3,524,400
Pasadena	58.5	55.6	50.2	58.5	$421,200
San Diego [1]	1278.4	1039.9	1055.3	1278.4	9,204,480
San Fernando	6.5	0.1	0.0	6.5	$46,800
San Marino	5.2	5.2	3.5	5.2	$37,440
Santa Ana	29.7	14.5	16.4	29.7	213,840
Santa Monica	27.6	26.2	25.0	27.6	198,720
Three Valleys	171.4	168.1	132.7	171.4	1,234,080
Torrance	41.6	35.5	39.3	41.6	299,520
Upper San Gabriel	63.8	36.9	27.6	63.8	459,360
West Basin	262.3	243.3	221.3	262.3	1,888,560
Western	289.1	271.4	219.9	289.1	2,081,520
Total	**4,673.8**	**4,239.7**	**3,927.1**	**4,759.5**	**$ 34,268,400**

Totals may not foot due to rounding

Table 2-16
Readiness-to-Serve Charge (by Member Agency)
Calendar Year 2011 RTS charge

Member Agency	Rolling Ten-Year Average Firm Deliveries (Acre-Feet) FY1999/00 - FY2008/09	RTS Share	12 months @ $125 million per year (1/11-12/11)
Anaheim	20,966	1.11%	$ 1,382,122
Beverly Hills	12,737	0.67%	839,692
Burbank	12,908	0.68%	850,938
Calleguas MWD	113,610	5.99%	7,489,554
Central Basin MWD	63,256	3.34%	4,170,058
Compton	3,146	0.17%	207,408
Eastern MWD	92,013	4.85%	6,065,789
Foothill MWD	11,570	0.61%	762,706
Fullerton	9,694	0.51%	639,087
Glendale	24,150	1.27%	1,592,015
Inland Empire Utilities Agency	61,205	3.23%	4,034,823
Las Virgenes MWD	23,282	1.23%	1,534,813
Long Beach	36,970	1.95%	2,437,211
Los Angeles	314,757	16.60%	20,749,798
Municipal Water District of Orange County	231,692	12.22%	15,273,878
Pasadena	23,397	1.23%	1,542,428
San Diego County Water Authority	491,238	25.91%	32,384,010
San Fernando	119	0.01%	7,819
San Marino	1,001	0.05%	65,963
Santa Ana	12,743	0.67%	840,028
Santa Monica	12,794	0.67%	843,429
Three Valleys MWD	73,095	3.85%	4,818,678
Torrance	20,742	1.09%	1,367,401
Upper San Gabriel Valley MWD	15,631	0.82%	1,030,447
West Basin MWD	141,522	7.46%	9,329,606
Western MWD	71,906	3.79%	4,740,301
MWD Total	**1,896,143**	**100.00%**	**$ 125,000,000**

Totals may not foot due to rounding

Table 2-17
Purchase Order Commitments and Tier 1 Limits (by Member Agency)

	2011 Tier 1 Limit with Opt-outs	Purchase Order Commitment (acre-feet)
Anaheim	22,240	148,268
Beverly Hills	13,380	89,202
Burbank	16,336	108,910
Calleguas	110,249	692,003
Central Basin	72,361	482,405
Compton	5,058	33,721
Eastern	87,740	504,664
Foothill	10,997	73,312
Fullerton	11,298	75,322
Glendale	26,221	174,809
Inland Empire	59,792	398,348
Las Virgenes	21,087	137,103
Long Beach	39,471	263,143
Los Angeles	304,970	2,033,132
MWDOC	228,130	1,486,161
Pasadena	21,180	141,197
San Diego	547,239	3,342,571
San Fernando	630	-
San Marino	1,199	-
Santa Ana	12,129	80,858
Santa Monica	11,515	74,062
Three Valleys	70,474	469,331
Torrance	20,967	139,780
Upper San Gabriel	16,512	110,077
West Basin	156,874	1,045,825
Western	69,720	391,791
Total	**1,957,768**	**12,495,995**

Totals may not foot due to rounding.

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Water Quality 4

Metropolitan's planning efforts have recognized the importance of the quality of its water supplies. To the extent possible, Metropolitan responds to water quality concerns by concentrating on protecting the quality of the source water and developing water management programs that maintain and enhance water quality. Contaminants that cannot be sufficiently controlled through protection of source waters must be handled through changed water treatment protocols or blending. These practices can increase costs and/or reduce operating flexibility and safety margins. In addition, Metropolitan has developed enhanced security practices and policies in response to national security concerns.

Background

Implementing the major components of Metropolitan's planning efforts – groundwater storage, recycled water, and minimized impacts on the Delta – requires meeting specific water quality targets for imported water. Metropolitan has two major sources of water: the Colorado River and the State Water Project (SWP). Groundwater inflows are also received into the SWP through groundwater banking programs in the Central Valley. Each source has specific quality issues, which are summarized in this section. To date, Metropolitan has not identified any water quality risks that cannot be mitigated. As described in this section, the only potential effect of water quality on the level of water supplies based on current knowledge could result from increases in the salinity of water resources. If diminished water quality caused a need for membrane treatment, Metropolitan could experience losses of up to 15 percent of the water processed. However, Metropolitan would only process a small proportion of the affected water and would reduce total salinity by blending the processed water with the remaining unprocessed water. Thus, Metropolitan anticipates no significant reductions in water supply availability from these sources due to water quality concerns over the study period.

Colorado River

High salinity levels represent a significant issue associated with Colorado River supplies. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate and Chromium VI, which are discussed later in this chapter. Metropolitan has also been active in efforts to protect these supplies from potential increases in nutrient loading due to urbanization, as well as investigating the sources and occurrence of constituents of emerging concern, such as N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). Metropolitan fully expects its source water protection efforts to be successful, so the only foreseeable water quality constraint to the use of Colorado River water will be the need to blend (mix) it with SWP supplies to meet the adopted salinity standards.

State Water Project

The key water quality issues on the SWP are disinfection byproduct precursors, in particular, total organic carbon and bromide. Metropolitan is working to protect the water quality of this source, but it has needed to upgrade its water treatment

plants to deal adequately with disinfection byproducts. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant, and they may place some near term restrictions on Metropolitan's ability to use SWP water. Metropolitan expects these treatment restrictions to be overcome through the addition of ozone disinfection at its treatment plants. Arsenic is also of concern in some groundwater storage programs. Groundwater inflows into the California Aqueduct are managed to comply with regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels are significantly higher in the SWP system than within the Colorado River, leading to the potential for algal related concerns that can affect water management strategies. Metropolitan is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants. Also, as in the Colorado River watershed, Metropolitan is active in studies on the occurrence, sources, and fate and transport of constituents of emerging concern, such as NDMA and PPCPs.

Local Agency Supplies and Groundwater Storage

New standards for contaminants, such as arsenic, and other emerging standards may add costs to the use of groundwater storage and may affect the availability of local agency groundwater sources. These contaminants are not expected to affect the availability of Metropolitan supplies, but they may affect the availability of local agency supplies, which could in turn affect the level of demands on Metropolitan supplies if local agencies abandon supplies in lieu of treatment options. Metropolitan has not analyzed the effect that many of these water quality issues could have on local agency supply availability. There have, however, been some investigations into the supply impacts of perchlorate groundwater contamination as indicated later in this section.

In summary, the major regional concerns include the following:

- Salinity
- Perchlorate
- Total organic carbon and bromide (disinfection byproduct precursors)
- Nutrients (as it relates to algal productivity)
- Arsenic
- Uranium
- Chromium VI
- N-nitrosodimethylamine (NDMA)
- Pharmaceuticals and personal care products (PPCPs)

Metropolitan has taken several actions and adopted programs to address these contaminants and ensure a safe and reliable water supply. These actions, organized by contaminant, are discussed below. Another constituent previously identified in the 2005 RUWMP as a regional concern, methyl tertiary-butyl ether (MTBE), is now a decreasing concern due to the elimination of this chemical as a gasoline additive in California. This is also further discussed below, along with other water quality programs that Metropolitan has been engaged in to protect its water supplies.

Issues of Concern

Salinity

Imported water from the Colorado River has high salinity levels, so it must be blended (mixed) with lower-salinity water from the SWP to meet salinity management goals. Higher salinity levels in either Colorado River water or groundwater would increase the proportion of SWP supplies required to meet the adopted imported water salinity objectives. Metropolitan adopted an imported water salinity goal because higher salinity could increase costs and reduce operating flexibility. For example,

1. If diminished water quality causes a need for membrane treatment, the process typically results in losses of up to 15 percent of the water processed. These losses result both in an increased requirement for additional water supplies and environmental constraints related to brine disposal. In addition, the process is costly. However, only a portion of the imported water would need to be processed, so the possible loss in supplies is small.
2. High total dissolved solids (TDS) in water supplies leads to high TDS in wastewater, which lowers the usefulness and increases the cost of recycled water.
3. Degradation of imported water supply quality could limit the use of local groundwater basins for storage because of standards controlling the quality of water added to the basins.

In addition to the link between water supply and water quality, Metropolitan has identified economic benefits from reducing the TDS concentrations of water supplies. Estimates show that a simultaneous reduction in salinity concentrations of 100 milligrams per liter (mg/L) in both the Colorado River and SWP supplies will yield economic benefits of $95 million per year within Metropolitan's service territory.[1] This estimate has added to Metropolitan's incentives to reduce salinity concentrations within the region's water supplies.

For all of these reasons, Metropolitan's Board approved a Salinity Management Policy on April 13, 1999. The policy set a goal of achieving salinity concentrations in delivered water of less than 500 mg/L TDS. The Salinity Management Policy is further discussed later in this section.

Within Metropolitan's service area, local water sources account for approximately half of the salt loading, and imported water accounts for the remainder. All of these sources must be managed appropriately to sustain water quality and supply reliability goals. The following sections discuss the salinity issues relevant to each of Metropolitan's major supply sources.

Colorado River

Water imported via the Colorado River Aqueduct (CRA) has the highest level of salinity of all of Metropolitan's sources of supply, averaging around 630 mg/L since 1976. Concern over salinity levels in the Colorado River has existed for many years. To deal with the concern, the International Boundary and Water Commission approved Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River in 1973, and the President approved the Colorado River Basin Salinity Control Act in 1974. High TDS in the Colorado River as it entered Mexico and the concerns of the seven basin states regarding the quality of Colorado River water in the United States drove these initial actions. To foster interstate cooperation on this issue, the seven basin states formed the Colorado River Basin Salinity Control Forum (Forum).

The salts in the Colorado River system are indigenous and pervasive, mostly resulting from saline sediments in the Basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. The Colorado River Basin Salinity Control Program is designed to prevent a portion of this abundant salt supply from moving into the river system. The program targets the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs.

The Forum proposed, the states adopted, and the U. S. Environmental Protection Agency (USEPA) approved water quality standards in 1975, including numeric criteria and a plan for controlling salinity increases. The standards require that the plan ensure that the flow-weighted average annual salinity remain at or below the 1972 levels,

[1] Metropolitan Water District of Southern California and U.S. Bureau of Reclamation, Salinity Management Study: Final Report (June 1999)

while the Basin states continue to develop their 1922 Colorado River Compact-apportioned water supply. The Forum selected three stations on the main stream of the lower Colorado River as appropriate points to measure the river's salinity. These stations and numeric criteria are (1) below Hoover Dam, 723 mg/l; (2) below Parker Dam, 747 mg/l; and (3) at Imperial Dam, 879 mg/l. The numeric criteria are flow-weighted average annual salinity values.

By some estimates, concentrations of salts in the Colorado River cause approximately $353 million in quantified damages in the lower Basin each year. The salinity control program has proven to be very successful and cost-effective. Salinity control projects have reduced salinity concentrations of Colorado River water on average by over 100 mg/L or $264 million per year (2005 dollars) in avoided damages.

During the high water flows of 1983-1986, salinity levels in the CRA dropped to a historic low of 525 mg/L. However, during the 1987-1992 drought, higher salinity levels of 600 to 650 mg/L returned. TDS in Lake Havasu was measured at 628 mg/L in November 2009.

State Water Project

Water supplies from the SWP have significantly lower TDS concentrations than the Colorado River, averaging approximately 250 mg/L in water supplied through the East Branch and 325 mg/L on the West Branch over the long-term, with short term variability as a result of hydrologic conditions.[2] Because of this lower salinity, Metropolitan blends SWP water with high salinity CRA water to reduce the salinity concentrations of delivered water. However, both the supply and the TDS concentrations of SWP water can vary significantly in response to hydrologic conditions in the Sacramento-San Joaquin watersheds.

As indicated above, the TDS concentrations of SWP water can vary widely over short periods of time. These variations reflect seasonal and tidal flow patterns, and they pose an additional problem for use of blending as a management tool to lower the higher TDS from the CRA supply. For example, in the 1977 drought, the salinity of SWP water reaching Metropolitan increased to 430 mg/L, and supplies became limited. During this same event, salinity at the SWP's Banks pumping plant exceeded 700 mg/L. Under similar circumstances, Metropolitan's 500 mg/L salinity objective could only be achieved by reducing imported water from the CRA. Thus, it may not always be possible to maintain both the salinity objective and water supply reliability unless salinity concentrations of source supplies can be reduced.

A federal court ruling and a resulting biological opinion issued through consultation with U.S. Fish and Wildlife Service addressing the effects of the water supply pumping operations on Delta smelt has limited SWP exports at specified times of the year since December 2007. These restrictions have increased reliance on higher salinity Colorado River water, impacting the ability at times to meet Metropolitan's goal of 500 mg/L TDS at its blend plants. Drought conditions leading to lower SWP water supply allocations in recent years also affects Metropolitan's ability to meet its salinity goal.

TDS objectives in Article 19 of the SWP Water Service Contract specify a ten-year average of 220 mg/L and a maximum monthly average of 440 mg/L. These objectives have not been met, and Metropolitan is working with DWR and other agencies on programs aimed at reducing salinity in Delta supplies. These programs aim to improve salinity on the San Joaquin River through modifying agricultural drainage and developing comprehensive basin plans. In addition, studies are underway to evaluate the benefits in reduced salinity of modifying levees in Franks Tract and other flooded islands in the Delta, or by placing operable gates in

[2] The higher salinity in the West Branch deliveries is due to salt loadings from local streams, operational conditions, and evaporation at Pyramid and Castaic Lakes.

strategic locations to impede transport of seawater derived salt.

Recycled Water

Wastewater flows always experience significantly higher salinity concentrations than the potable water supply. Typically, each cycle of urban water use adds 250 to 400 mg/L of TDS to the wastewater. Salinity increases tend to be higher where specific commercial or industrial processes add brines to the discharge stream or where brackish groundwater infiltrates into the sewer system.

Where wastewater flows have high salinity concentrations, the use of recycled water may be limited or require more expensive treatment. Landscape irrigation and industrial reuse become problematic at TDS concentrations of over 1,000 mg/L. Some crops are particularly sensitive to high TDS concentrations, and the use of high-salinity recycled water may reduce yields of these crops. In addition, concern for the water quality in groundwater basins may lead to restrictions on the use of recycled water on lands overlying those basins.

These issues are exacerbated during times of drought, when the salinity of imported water supplies increases because of increased salinity in wastewater flows and recycled water. Basin management plans and recycled water customers may restrict the use of recycled water at a time when its use would be most valuable. To maintain the cost-effectiveness of recycled water, therefore, the salinity level of the region's potable water sources and wastewater flows must be controlled.

In May 2009, the State Water Resources Control Board (SWRCB) adopted a Recycled Water Policy[3] to help streamline the permitting process and help establish uniform statewide criteria for recycled water projects. This policy promotes the development of watershed- or basin-wide salt management plans (to then be adopted by the respective Regional Boards) to meet water quality objectives and protect beneficial uses, rather than imposing project-by-project restrictions. The Recycled Water Policy identifies several criteria to guide recycled water irrigation or groundwater recharge project proponents in developing a salt (and nutrient) management plan.

Groundwater Basins

Increased TDS in groundwater basins occurs either when basins near the ocean are overdrafted, leading to seawater intrusion, or when agricultural and urban return flows add salts to the basins. Much of the water used for agricultural or urban irrigation infiltrates into the aquifer, so where irrigation water is high in TDS or where the water transports salts from overlying soil, the infiltrating water will increase the salinity of the aquifer. In addition, wastewater discharges in inland regions may lead to salt buildup from fertilizer and dairy waste. In the 1950s and 1960s, Colorado River water was used to recharge severely overdrafted aquifers and prevent saltwater intrusion. As a result, the region's groundwater basins received more than 3.0 MAF of this high-TDS imported water, significantly impacting salt loadings.

In the past, these high salt concentrations have caused some basins within Metropolitan's service area to be unsuitable for municipal uses if left untreated. The Arlington Basin in Riverside and the Mission Basin in San Diego required demineralization before they could be returned to municipal service. The capacity of the larger groundwater basins makes them better able to dilute the impact of increasing salinity. While most groundwater basins within the region still produce water of acceptable quality, this resource must be managed carefully to minimize further degradation. Even with today's more heightened concern regarding salinity, approximately 600,000 tons of salts per year accumulate within the region, leading to ever-increasing salinity concentrations in many groundwater basins.

[3] http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf

Table 4-1 shows the salinity from existing productive groundwater wells within the region, and Figure 4-1 shows the distribution of those salinity concentrations. To protect the quality of these basins, regional water quality control boards often place restrictions on the salinity concentrations of water used for basin recharge or for irrigation of lands overlying the aquifers. Those situations may restrict water reuse and aquifer recharge, or they may require expensive mitigation measures.

Metropolitan has participated with water and wastewater agencies and the Santa Ana Regional Water Quality Control Board (Regional Board) in a coordinated program to develop water quality data for local and imported supplies used to recharge groundwater basins in the Santa Ana River watershed.[4] In January 2008, this workgroup submitted its "Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin" to the Santa Ana Regional Board. This initial agreement addresses nitrogen and TDS and includes the following tasks:

1. Prepare a projection of ambient water quality in each groundwater management zone at six-year intervals for the subsequent 20 years.
2. Determine the impacts of foreseeable recharge projects and compare to baseline ambient water quality with salinity objectives.
3. Compare current water quality in each groundwater management zone with the ambient water quality projection made six years earlier, together with an evaluation of the reason(s) for any differences.

The Salinity Management Policy

The Salinity Management Policy adopted by Metropolitan's Board specified a salinity objective of 500 mg/L for blended imported water. It also identified the need for both local and imported water sources to be managed comprehensively to maintain the ability to use recycled water and groundwater. To achieve these targets, SWP water supplies are blended with Colorado River supplies. Using this approach, the salinity target could be met in seven out of ten years. In the other three years, hydrologic conditions would result in increased salinity and reduced volume of SWP supplies. Metropolitan has alerted its local agencies that such conditions are inevitable, and that despite its best efforts, high salinity could be a concern at such times. Metropolitan has also urged its member agencies to structure the operation of their local projects and groundwater so they are prepared to mitigate the effect of higher salinity levels in imported waters. In addition, Metropolitan will concentrate on obtaining better quality water in the spring/summer months (April through September) to maximize the use of recycled water in agriculture.

Table 4-1
Salinity Levels at Productive Groundwater Wells

TDS Concentration (mg/L)	Annual Production (Million Acre-Feet)	Percent of Production
Less than 500	1.06	78
500 to 1,000	0.15	11
Greater than 1,000	0.15	11
Total	**1.36**	**100**

Source: Metropolitan Water District of Southern California, Salinity Management Study, Final Report, June 1999.

[4] http://www.swrcb.ca.gov/rwqcb8/board_decisions/adopted_orders/orders/2008/08_019.pdf

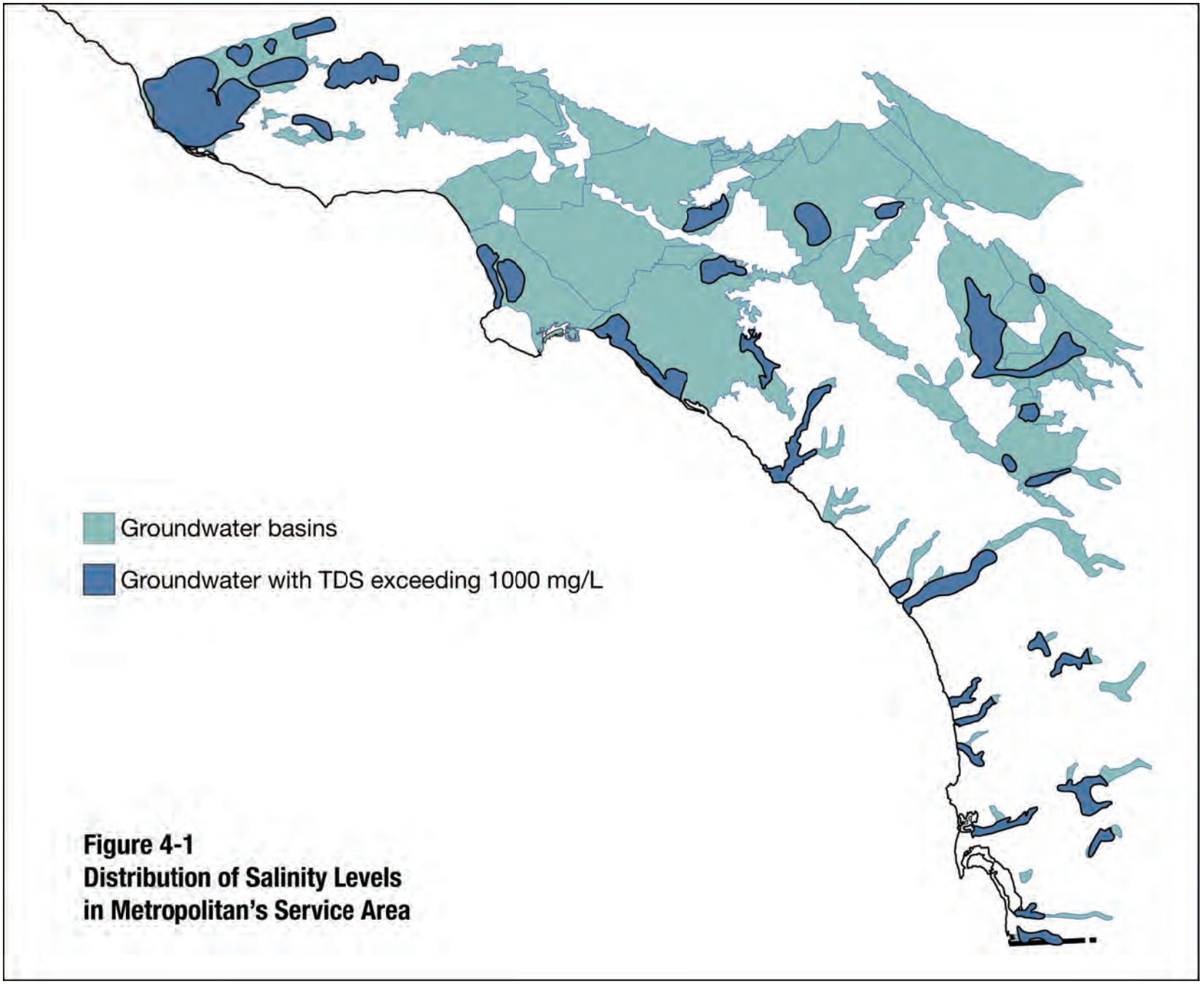

Figure 4-1
Distribution of Salinity Levels in Metropolitan's Service Area

Perchlorate

Perchlorate compounds are used as a main component in solid rocket propellant, and are also found in some types of munitions and fireworks. Perchlorate compounds quickly dissolve and become highly mobile in groundwater. Unlike many other groundwater contaminants, perchlorate neither readily interacts with the soil matrix nor degrades in the environment. Conventional drinking water treatment (as utilized at Metropolitan's water treatment plants) is not effective in removing perchlorate.

The primary human health concern related to perchlorate is its effects on the thyroid. Perchlorate interferes with the thyroid's ability to produce hormones required for normal growth and development. Pregnant women who are iodine deficient and their fetuses, infants and small children with low dietary iodide intake and individuals with hypothyroidism may be more sensitive to the effects of perchlorate.

The California Department of Public Health (CDPH) established a primary drinking water standard for perchlorate with an MCL of 6 micrograms per liter (μg/L)[5] effective October 18, 2007. There is currently no federal drinking water standard for perchlorate, but the USEPA is in the process of making its final regulatory determination for this contaminant. A regulatory determination would be the first step toward developing a national drinking water standard. Metropolitan has offered comments to USEPA during this regulatory process, focusing on the need to protect the Colorado River and to address cleanup of impacted water supplies as a result of federal institutions within its service area. In essence, Metropolitan urged for necessary actions to ensure expedited cleanup in areas that a California drinking water standard could not be enforced.

Perchlorate was first detected in Colorado River water in June 1997 and was traced back to Las Vegas Wash. The source of contamination was found to be emanating from a chemical manufacturing facility in Henderson, Nevada, now owned by Tronox, Inc. Tronox is currently responsible for the ongoing perchlorate remediation of the site. Another large perchlorate groundwater plume is also present in the Henderson area from a second industrial site, and although not known to have reached Las Vegas Wash yet, remediation activities are ongoing for cleanup of that plume by American Pacific Corporation (AMPAC).

Following the detection of perchlorate in the Colorado River, Metropolitan, along with USEPA and agencies in Nevada including the Nevada Division of Environmental Protection (NDEP), organized the forces necessary to successfully treat and decrease the sources of perchlorate loading. Under NDEP oversight, remediation efforts began in 1998 and treatment operations became fully operational in 2004. These efforts have reduced perchlorate loading into Las Vegas Wash from over 1000 lbs/day (prior to treatment) to 60-90 lbs/day since early 2007. This has resulted in over 90 percent reduction of the perchlorate loading entering the Colorado River system. In January 2009, Tronox filed for Chapter 11 bankruptcy protection citing significant environmental liabilities taken from the previous site owner. Tronox has continued operating its remediation system during the bankruptcy proceedings.

Perchlorate levels in Colorado River water at Lake Havasu have decreased significantly in recent years from its peak of 9 μg/L in May 1998 as a result of the aggressive clean-up efforts. Levels have remained less than 6 μg/L since October 2002, and have been typically less than 2 μg/L since June 2006. Metropolitan routinely monitors perchlorate at 34 locations within its system and levels currently remain at non-detectable levels (below 2 μg/L). Metropolitan has not detected perchlorate in the SWP since monitoring began in 1997.

[5] 1 microgram per liter is equivalent to 1 part per billion

Perchlorate has also been found in groundwater basins within Metropolitan's service area, largely from local sources. The vast majority of locations where perchlorate has been detected in the groundwater are associated with the manufacturing or testing of solid rocket fuels for the Department of Defense and the National Aeronautics and Space Administration (NASA), or with the manufacture, storage, handling, or disposal of perchlorate (such as Aerojet in Azusa in the Main San Gabriel Basin and the Jet Propulsion Laboratory/NASA in the Raymond Basin). Past agricultural practices using fertilizers laden with naturally occurring perchlorate have also been implicated in some areas.

Metropolitan has conducted several surveys to determine the impact of perchlorate on its member and retail agencies. As of October 2007, 18 member agencies have detected perchlorate in their service areas at levels greater than 4 μg/L, while 11 have detected levels greater than 6 μg/L in at least 101 out of 1337 wells (7.6 percent). Member and retail agencies have shut down 32 wells over the years due to perchlorate contamination, losing more than 52.5 TAF per year of their groundwater production. Many of these agencies have built new wells, blended their water, or installed ion exchange treatment systems to reduce perchlorate levels, thus lowering their potential additional demand for Metropolitan water supplies to about 15 TAF per year.

Metropolitan has investigated technologies to mitigate perchlorate contamination. Perchlorate cannot be removed using conventional water treatment. Nanofiltration and reverse osmosis do work effectively but at a very high cost. Aerojet has implemented biological treatment through fluidized bed reactors (FBR) in Rancho Cordova and is re-injecting the treated water into the ground. Tronox also utilizes an FBR process train for the cleanup of their Henderson site. A number of sites in Southern California have successfully installed ion exchange systems to treat perchlorate impacted groundwater. The city of Pasadena has been using ion exchange treatment at one well site and, in November 2009, completed a study of biological treatment for perchlorate removal in groundwater. Funding for this study was provided through a Congressional mandate from USEPA to Metropolitan.

Treatment options are available to recover groundwater supplies contaminated with perchlorate. However, it is very difficult to predict whether treatment will be pursued to recover all lost production because local agencies will make decisions based largely on cost considerations, ability to identify potentially responsible parties for cleanup, and the availability of alternative supplies.

Total Organic Carbon and Bromide

Disinfection byproducts (DBPs) form when source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone. Studies have shown a link between certain cancers and DBP exposure. In addition, some studies have shown an association between reproductive and developmental effects and chlorinated water. While many DBPs have been identified and some are regulated under the Safe Drinking Water Act, there are others that are not yet known. Even for those that are known, the potential adverse health effects may not be fully characterized.

Water agencies began complying with new regulations to protect against the risk of DBP exposure in January 2002. This rule, known as the Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule, required water systems to comply with new MCLs and a treatment technique to improve control of DBPs. USEPA then promulgated the Stage 2 D/DBP Rule in January 2006 that makes regulatory compliance more challenging as compliance is based on a locational basis, rather than on a distribution system-wide basis.

Existing levels of TOC and bromide in Delta water supplies present significant concern for Metropolitan's ability to maintain safe drinking water supplies and comply with regulations. Levels of these constituents in SWP water

increase several fold due to agricultural drainage and seawater intrusion as water moves through the Delta. One of Metropolitan's primary objectives for the CALFED Bay-Delta process is protection and improvement of the water quality of its SWP supplies to ensure compliance with current and future drinking water regulations. Source water protection of SWP water supplies is a necessary component of meeting these requirements cost effectively.

The CALFED Record of Decision released in August 2000 adopted the following water quality goals for TOC and bromide:

- Average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 µg/L bromide and 3.0 mg/L total organic carbon, or
- An equivalent level of public health protection using a cost-effective combination of alternative source waters, source control, and treatment technologies.

CALFED's Bay-Delta Program calls for a wide array of actions to improve Bay-Delta water quality, ranging from improvements in treatment technology to safeguarding water quality at the source. These actions include conveyance improvements, alternative sources of supply, changes in storage and operations, and advanced treatment by water supply agencies.

Source water quality improvements must be combined with cost-effective water treatment technologies to ensure safe drinking water at a reasonable cost. Metropolitan has five treatment plants: two that receive SWP water exclusively, and three that receive a blend of SWP and Colorado River water. In 2003 and 2005, Metropolitan completed upgrades to its SWP-exclusive water treatment plants, Mills and Jensen, respectively, to utilize ozone as its primary disinfectant. This ozonation process avoids the production of certain regulated disinfection byproducts that would otherwise form in the chlorine treatment of SWP water. The non-ozone plants utilizing blended water have met federal guidelines for these byproducts through managing the blend of SWP and Colorado River water. To maintain the byproducts at a level consistent with federal law, Metropolitan limits the percentage of water from the SWP used in each plant. In mid 2010, Metropolitan anticipates ozone at the Skinner water treatment plant to come online. Metropolitan's Board has also adopted plans to install ozonation at its other two blend plants with a total estimated ozone retrofit program cost of $1.2 billion for all five plants.

Nutrients

Elevated levels of nutrients (phosphorus and nitrogen compounds) can stimulate nuisance algal and aquatic weed growth that affects consumer acceptability, including the production of noxious taste and odor compounds and algal toxins. In addition to taste and odor toxin concerns, increases in algal and aquatic weed biomass can impede flow in conveyances, shorten filter run times and increase solids production at drinking water treatment plants, and add to organic carbon loading. Further, nutrients can provide an increasing food source that may lead to the proliferation of quagga and zebra mussels, and other invasive biological species. Studies have shown phosphorus to be the limiting nutrient in both SWP and Colorado River supplies. Therefore, any increase in phosphorus loading has the potential to stimulate algal growth, leading to the concerns identified above.

SWP supplies have significantly higher nutrient levels than Colorado River supplies. Wastewater discharges, agricultural drainage, and nutrient-rich soils in the Delta are primary sources of nutrient loading to the SWP. Metropolitan and other drinking water agencies receiving Delta water have been engaged in efforts to minimize the effects of nutrient loading from Delta wastewater plants. Metropolitan reservoirs receiving SWP water have experienced numerous taste and

odor episodes in recent years. For example, in 2005, Metropolitan reservoirs experienced 12 taste and odor events requiring treatment. A taste and odor event can cause a reservoir to be bypassed and potentially have a short-term effect on the availability of that supply. Metropolitan has a comprehensive program to monitor and manage algae in its source water reservoirs. This program was developed to provide an early warning of algae related problems and taste and odor events to best manage water quality in the system.[6]

Although phosphorus levels are much lower in the Colorado River than the SWP, this nutrient is still of concern. Despite relatively low concentrations (Colorado River has been considered an oligotrophic, or low-productivity, system), any additions of phosphorus to Colorado River water can result in increased algal growth. In addition, low nutrient Colorado River water is relied upon by Metropolitan to blend down the high nutrient SWP water in Metropolitan's blend reservoirs. With population growth expected to continue in the future (e.g., Las Vegas area), ensuring high levels of treatment at wastewater treatment plants to maintain existing phosphorus levels will be critical in minimizing the operational, financial, and public health impacts associated with excessive algal growth and protect downstream drinking water uses. In addition, Metropolitan continues its involvement with entities along the lower Colorado River seeking to enhance wastewater management (and therefore better manage nutrient impacts) within river communities.

Although current nutrient loading is of concern for Metropolitan and is anticipated to have cost implications, with its comprehensive monitoring program and response actions to manage algal related issues, there should be no impact on availability of water supplies. Metropolitan's source water protection program will continue to focus on preventing increases in future nutrient loading as a result of urban and agricultural sources.

Arsenic

Arsenic is a naturally occurring element found in rocks, soil, water, and air. It is used in wood preservatives, alloying agents, certain agricultural applications, semi-conductors, paints, dyes, and soaps. Arsenic can get into water from the natural erosion of rocks, dissolution of ores and minerals, runoff from agricultural fields, and discharges from industrial processes. Long-term exposure to elevated levels of arsenic in drinking water has been linked to certain cancers, skin pigmentation changes, and hyperkeratosis (skin thickening).

The MCL for arsenic in domestic water supplies was lowered to 10 μg/L, with an effective date of January 2006 in the federal regulations, and an effective date of November 2008 in the California regulations. The standard impacts both groundwater and surface water supplies. Historically, Metropolitan's water supplies have had low levels of this contaminant and would not require treatment changes or capital investment to comply with this new standard. However, some of Metropolitan's water supplies from groundwater storage programs are at levels near the MCL. These groundwater storage projects are called upon to supplement flow only during low SWP allocation years. Metropolitan has had to restrict flow from one program to limit arsenic increases in the SWP. Implementation of a pilot arsenic treatment facility by one groundwater banking partner has also resulted in increased cost. Moreover, Metropolitan has invested in solids handling facilities and implemented operational changes to manage arsenic in the solids resulting from the treatment process.

In April 2004, California's Office of Environmental Health Hazard Assessment (OEHHA) set a public health goal for arsenic

[6] William D. Taylor et al., *Early Warning and Management of Surface Water Taste-and-Odor Events*, Project No. 2614 (Denver, CO: American Water Works Association Research Foundation, 2006)

of 0.004 µg/L, based on lung and urinary bladder cancer risk. Monitoring results submitted to CDPH in 2001-2003 showed that arsenic is ubiquitous in drinking water sources, reflecting its natural occurrence. They also showed that many sources have arsenic detections above the 10 µg/L MCL. Southern California drinking water sources that contain concentrations of arsenic over 10 µg/L include San Bernardino (64 sources), Los Angeles (48 sources), Riverside (26 sources), Orange (4 sources), and San Diego (5 sources).[7]

The state detection level for purposes of reporting (DLR) of arsenic is 2 µg/L. Between 2001 and 2008, arsenic levels in Metropolitan's water treatment plant effluents ranged from not detected (< 2 µg/L) to 2.9 µg/L. For Metropolitan's source waters, levels in Colorado River water have ranged from not detected to 3.5 µg/L, while levels in SWP water have ranged from not detected to 4.0 µg/L. Increasing coagulant doses at water treatment plants can reduce arsenic levels for delivered water.

Some member agencies may face greater problems with arsenic compliance. A 1992 study for Central Basin Municipal Water District, for example, indicated that some of the Central Basin wells could have difficulty in complying with a lowered standard.[8] Water supplies imported by the Los Angeles Department of Water and Power may also contain arsenic above the MCL. The cost of arsenic removal from these supplies could vary significantly.

Uranium

A 16-million-ton pile of uranium mill tailings near Moab, Utah lies approximately 750 feet from the Colorado River. Due to the proximity of the pile to the Colorado River, there is a potential for the tailings to enter the river as a result of a catastrophic flood event or other natural disaster. In addition, contaminated groundwater from the site is slowly seeping into the river. The U.S. Department of Energy (DOE) is responsible for remediating the site, which includes removal and offsite disposal of the tailings and onsite groundwater remediation.

Previous investigations have shown uranium concentrations contained within the pile at levels significantly above the California MCL of 20 picocuries per liter (pCi/L). Metropolitan has been monitoring for uranium in the Colorado River Aqueduct and at its treatment plants since 1986. Monitoring at Lake Powell began in 1998. Uranium levels measured at Metropolitan's intake have ranged from 1-6 pCi/L, well below the California MCL. Conventional drinking water treatment, as employed at Metropolitan's water treatment plants, can remove low levels of uranium, however these processes would not be protective if a catastrophic event washed large volumes of tailings into the Colorado River. Public perception of drinking water safety is also of particular concern concerning uranium.

Remedial actions at the site since 1999 have focused on removing contaminated water from the pile and groundwater. Through 2009, over 2,700 pounds of uranium in contaminated groundwater have been removed. In July 2005, DOE issued its Final Environmental Impact Statement with the preferred alternative of permanent offsite disposal by rail to a disposal cell at Crescent Junction, Utah, located approximately 30 miles northwest of the Moab site.

Rail shipment and disposal of the uranium mill tailings pile from the Moab, Utah site began in April 2009. Through March 2010, DOE has shipped over 1 million tons of mill tailings to the Crescent Junction disposal cell. Using American Recovery and Reinvestment Act (ARRA) 2009 funding, DOE has increased shipments in order to meet its ARRA project

[7] From the CDPH web site: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Arsenic.aspx . Note that the numbers reported there may change because the website is frequently updated.

[8] *Summary Review on the Occurrence of Arsenic in the Central Groundwater Basin, Los Angeles County, California*, prepared by Richard C. Slade & Associates, Sept. 7, 1993.

commitment to ship an additional 2 million tons of mill tailings by September 2011 and accelerate overall clean-up of the site. DOE estimates completing movement of the tailings pile by 2025, with a goal of 2019 should additional funding be secured. Metropolitan continues to track progress of the remediation efforts, provide the necessary legislative support for rapid cleanup, and work with Congressional representatives to support increased annual appropriations for this effort.

Another uranium-related issue began receiving attention in 2008 due to a renewed worldwide interest in nuclear energy and the resulting increase in uranium mining claims filed throughout the western United States. Of particular interest were thousands of mining claims filed near Grand Canyon National Park and the Colorado River. Metropolitan has since sent letters to the Secretary of Interior to highlight source water protection and consumer confidence concerns related to uranium exploration and mining activities near the Colorado River, and advocate for close federal oversight over these activities. In 2009, Secretary of Interior Ken Salazar announced the two-year hold on new mining claims on 1 million acres adjacent to the Grand Canyon to allow necessary scientific studies and environmental analyses to be conducted. In 2009, H.R. 644 – Grand Canyon Watersheds Protection Act was introduced and if enacted, would permanently withdraw areas around the Grand Canyon from new mining activities.

Chromium VI

Chromium is a naturally occurring element found in rocks, soil, plants, and animals. Chromium III is typically the form found in soils and is an essential nutrient that helps the body use sugar, protein, and fat. Chromium VI is used in electroplating, stainless steel production, leather tanning, textile manufacturing, dyes and pigments, wood preservation and as an anti-corrosion agent. Chromium occurs naturally in deep aquifers and can also enter drinking water through discharges of dye and paint pigments, wood preservatives, chrome plating liquid wastes, and leaching from hazardous waste sites. In drinking water, Chromium VI is very stable and soluble in water, whereas chromium III is not very soluble. Chromium VI is the more toxic species and is known to cause lung cancer in humans when inhaled, but the health effects in humans from ingestion are still in question. There is evidence that when Chromium VI enters the stomach, gastric acids may reduce it to chromium III. However, recent studies conducted by the National Toxicology Program have shown that Chromium VI can cause cancer in animals when administered orally.

Currently, there are no drinking water standards for Chromium VI. Total chromium (including chromium III and Chromium VI) is regulated in California with an MCL of 50 μg/L. On August 20, 2009, OEHHA released a draft public health goal (PHG) of 0.06 μg/L for Chromium VI in drinking water. The PHG is a health-protective, non-regulatory level that will be used by CDPH in its development of an MCL. CDPH will set the MCL as close to the PHG as technically and economically feasible.

Metropolitan utilizes an analytical method with a minimum reporting level of 0.03 μg/L, which is less than the State detection level for purposes of reporting (DLR) of 1 μg/L. The results from all of Metropolitan's source and treated waters are less than the State DLR of 1 μg/L (except for one detection of 1 μg/L at the influent to the Mills water treatment plant). The following summarizes Chromium VI levels found in Metropolitan's system:

- In the past 10 years, results of source and treated water monitoring for Chromium VI indicate: Levels in Colorado River water are mostly not detected (<0.03 μg/L) but when detected range from 0.03 – 0.08 μg/L. SWP levels range from 0.03 – 0.8 μg/L. Treated water levels range from 0.03 – 0.7 μg/L.

- There is a slight increase in Chromium VI in the treated water from the oxidation (chlorination and ozonation) of natural background chromium (total) to Chromium VI.
- Colorado River monitoring results upstream and downstream of the Topock site (discussed below) have ranged from not detected (<0.03 μg/L) to 0.06 μg/L.
- Chromium VI in Metropolitan's groundwater pump-in storage programs in the Central Valley has ranged from not detected (< 1 μg/L) to 9.1 μg/L with the average for the different programs from 1.4 to 5.0 μg/L.
- Chromium VI has been detected in a groundwater aquifer on the site of a Pacific Gas and Electric (PG&E) gas compressor station located along the Colorado River near Topock, Arizona.

PG&E used Chromium VI as an anti-corrosion agent in its cooling towers from 1951 to 1985. Wastewater from the cooling towers was discharged from 1951 to 1968 into a dry wash next to the station. Monitoring wells show the plume concentration has peaked as high as 16,000 μg/L. PG&E operates an interim groundwater extraction and treatment system that is protecting the Colorado River. Quarterly monitoring of the river has shown levels of Chromium VI less than 1 μg/L, which are considered background levels. The California Department of Toxic Substances Control and the U. S. Department of Interior are the lead state and federal agencies overseeing the cleanup efforts. Metropolitan participates through various stakeholder workgroups and partnerships that include state and federal regulators, Indian tribes, and other stakeholders (e.g., Colorado River Board) involved in the corrective action process. In 2010, it is anticipated that a final treatment alternative will be selected, and an Environmental Impact Report will be released for the recommended cleanup alternative.

The federal- and state-approved technologies for removing total chromium from drinking water include coagulation/ filtration, ion exchange, reverse osmosis, and lime softening. Potential treatment technologies for Chromium VI in drinking water may include reduction/chemical precipitation, an ion exchange, or reverse osmosis. For several years, the cities of Glendale, Burbank, and Los Angeles have been voluntarily limiting Chromium VI levels in their drinking water to 5 μg/L, an order of magnitude lower than the current statewide total chromium standard of 50 μg/L. The experience of these agencies in the treatment of water containing Chromium VI will be helpful in CDPH's evaluations of treatment technologies and associated costs, which are required as part of a proposed MCL regulation package.

N-Nitrosodimethylamine

N-Nitrosodimethylamine (NDMA) is part of a family of organic chemicals called nitrosamines and is a byproduct of the disinfection of some natural waters with chloramines. Metropolitan utilizes chloramines as a secondary disinfectant at its treatment plants. Wastewater treatment plant effluent and agricultural runoff can contribute organic material into source waters which react to form NDMA at water treatment plants. Certain polymers can also contribute NDMA precursor materials. Some NDMA control measures or removal technologies may be required to avoid adverse impacts on Southern California drinking water supplies. Metropolitan is involved in several projects to understand the watershed sources and occurrence of NDMA precursors in Metropolitan source waters, and to develop treatment strategies to minimize NDMA formation in drinking water treatment plants and distribution systems. Special studies conducted at Metropolitan have shown removal of NDMA using advanced oxidation processes. Other treatment process such as biological, membrane, and carbon adsorption need to be evaluated for NDMA removal.

USEPA considers NDMA to be a probable human carcinogen. USEPA placed NDMA in the Unregulated Contaminant Monitoring

Regulation 2 (UCMR2) and on the Contaminant Candidate List 3 (CCL3). CDPH also considers NDMA to be a probable human carcinogen. CDPH has not established a MCL for NDMA. However, in 1998 CDPH established a notification level of 0.01 µg/L. Occurrences of NDMA in treated water supplies at concentrations greater than 0.01 µg/L are recommended to be included in the utility's annual Consumer Confidence Report. In December 2006, OEHHA set a public health goal for NDMA of 0.003 µg/L. Metropolitan has monitored its source waters (at treatment plant influents) and treated waters on a quarterly basis since 1999. Test results for the presence of NDMA in Metropolitan's system have ranged from non-detect (reporting limit of 0.002 µg/L) to 0.014 µg/L. Preliminary data from UCMR2 confirm that the presence of NDMA is not limited to Metropolitan waters, but is widespread. NDMA, or a broader class of nitrosamines, may likely be the next disinfection byproduct(s) to be regulated by USEPA.

Pharmaceuticals and Personal Care Products

Pharmaceuticals and personal care products (PPCPs) are a growing concern to the water industry. Numerous studies have reported the occurrence of these emerging contaminants in treated wastewater, surface water, and sometimes, in finished drinking water in the United States and around the world. The sources of PPCPs in the aquatic environment include (but may not be limited to) treated wastewater and industrial discharge, agricultural run-off, and leaching of municipal landfills. Currently, there is no evidence of human health risks from long-term exposure to the low concentrations (low ng/L; parts per trillion) of PPCPs found in some drinking water. Furthermore, there are no regulatory requirements for PPCPs in drinking water. In October 2009, USEPA included 13 PPCPs on the CCL3; however, currently there are no standardized analytical methods for these compounds.

In 2007, Metropolitan implemented a monitoring program to determine the occurrence of PPCPs and other organic wastewater contaminants in Metropolitan's treatment plant effluents and selected source water locations within the Colorado River and SWP watersheds. Some PPCPs have been detected at very low ng/L levels, which is consistent with reports from other utilities. However, analytical methods are still being refined and more work is required to fully understand occurrence issues. Metropolitan has been actively involved in various studies related to PPCPs, including analytical methods improvements, and characterization of drinking water sources in California.

Metropolitan has participated with water and wastewater agencies and the Santa Ana Regional Board in a coordinated program to address emerging constituents relevant to local and imported supplies used to recharge groundwater basins in the Santa Ana River watershed. As part of the Regional Board-adopted "Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin", there are provisions for the workgroup to initiate development of monitoring for emerging unregulated constituents. Metropolitan, Orange County Water District, and the National Water Research Institute provided substantial input to the workgroup through its two-year monitoring study of emerging constituents in waters found throughout watersheds of the SWP, Colorado River, and Santa Ana River. In April 2009, the workgroup completed its Phase I Report summarizing its findings and recommendations regarding investigation into emerging constituents in water supplies. In December 2009, the workgroup submitted its proposed 2010/11 plan for monitoring of emerging constituents in imported and local waters. The workgroup also provided input to a Blue Ribbon Panel convened by the State Water Resources Control Board to review the emerging science of unregulated chemicals as it relates to the use of recycled water for irrigation and groundwater recharge.

Decreasing Concerns

Methyl Tertiary-Butyl Ether

Methyl tertiary-butyl ether (MTBE) was the primary oxygenate in virtually all the gasoline used in California, prior to the discovery that MTBE had contaminated groundwater supplies and was also found in surface water supplies. MTBE was banned in California as of December 31, 2003, although the concentration of MTBE in gasoline blends was voluntarily reduced beginning in January 2003. MTBE has subsequently been replaced by ethanol which is now the primary oxygenate in use. CDPH has adopted a primary MCL of 13 μg/L for MTBE based on carcinogenicity studies in animals. MTBE also has a California secondary MCL of 5 μg/L, which was established based on taste and odor concerns.

MTBE was introduced into surface water bodies from the motor exhausts of recreational watercraft. At Diamond Valley Lake and Lake Skinner, Metropolitan has taken steps to reduce the potential for MTBE contamination. In 2003, Metropolitan's Board authorized a non-polluting boating program for these reservoirs that calls for specific boat requirements (MTBE-free fuel and clean burning engines) and a monitoring program that will show if MTBE or other gasoline contaminants appear at the lake. Metropolitan regularly monitors its water supply for contamination from MTBE and other oxygenates. In recent years, MTBE testing results in source waters have remained at non-detectable levels (below 3 μg/L).

MTBE still presents a significant problem to local groundwater basins. Leaking underground storage tanks and poor fuel-handling practices in the past at local gas stations may provide a large source of MTBE. MTBE is very soluble in water and has low affinity for soil particles, so it moves quickly into the groundwater. Within Metropolitan's service area, local groundwater producers have been forced to close some of their wells due to MTBE contamination. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components. A combination of an advanced oxidation process (typically ozone and hydrogen peroxide) followed by granular activated carbon has been found to be effective in reducing the levels of these contaminants.

Although some groundwater supplies remain contaminated with this highly soluble chemical, contamination of Metropolitan's surface water supplies are no longer a problem. Further, improved underground storage tank requirements and monitoring, and the phase-out of MTBE as a fuel additive, will decrease the likelihood of MTBE groundwater problems in the future.

Other Water Quality Programs

In addition to monitoring for and controlling specific identified chemicals in the water supply, Metropolitan has undertaken a number of programs to protect the quality of its water supplies. These programs are summarized below.

Source Water Protection

Source water protection is the first step in a multi-barrier approach to provide safe and reliable drinking water. In accordance with California's Surface Water Treatment Rule, Title 22 of the California Code of Regulations, CDPH requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to identify possible sources of drinking water contamination, evaluate source and treated water quality, and recommend watershed management activities that will protect and improve source water quality. The most recent sanitary surveys for Metropolitan's water sources were completed in 2005 and 2006.[9] The next Sanitary Surveys for the watersheds of the

9 Metropolitan Water District of Southern California, *Colorado River Watershed Sanitary Survey, 2005 Update*. For the State Water Project, the sanitary survey report was prepared on behalf of the State Water Project Contractors Authority, in 2006, and was titled *California State Water Project Watershed Sanitary Survey, 2006 Update*.

Colorado River and the SWP will report on water quality issues and monitoring data through 2010. Metropolitan has an active source water protection program and continues to advocate on behalf of numerous SWP and Colorado River water quality protection issues.

Support SWP Water Quality Programs

Metropolitan supports DWR policies and programs aimed at maintaining or improving the quality of SWP water delivered to Metropolitan. In particular, Metropolitan supported the DWR policy to govern the quality of non-project water conveyed by the California Aqueduct. In addition, Metropolitan has supported the expansion of DWR's Municipal Water Quality Investigations Program beyond its Bay-Delta core water quality monitoring and studies to include enhanced water quality monitoring and forecasting of the Delta and SWP. These programs are designed to provide early warning of water quality changes that will affect treatment plant operations both in the short-term (hours to weeks) and up to seasonally. The forecasting model is currently suitable for use in a planning mode. It is expected that with experience and model refinement, it will be suitable to use as a tool in operational decision making.

Water Quality Exchanges

Metropolitan has implemented selective withdrawals from the Arvin-Edison storage program and exchanges with the Kern Water Bank to improve water quality. Although these programs were initially designed to provide dry-year supply reliability, they can also be used to store SWP water at periods of better water quality so the stored water may be withdrawn at times of lower water quality, thus diluting SWP water deliveries. Although elevated arsenic levels has been a particular concern in one groundwater banking program, there are also short-term water quality benefits that can be realized through other storage programs, such as groundwater pump-ins into the California Aqueduct with lower TOC levels (as well as lower bromide and TDS, in some programs).

Water Supply Security

The change in the national and international security situation has led to increased concerns about protecting the nation's water supply. In coordination with its member agencies, Metropolitan added new security measures in 2001 and continues to upgrade and refine procedures. Changes have included an increase in the number of water quality tests conducted each year (Metropolitan now conducts over 300,000 analytical tests on samples collected within our service area and source waters), as well as contingency plans that coordinate with the Homeland Security Office's multicolored tiered risk alert system.